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ANIMAL KINGDOM

ARRANGED IN CONFORMITY WITH ITS ORGANIZATION,

BY THE BARON CUVIER,

870

PERPETUAL SECRETARY TO THE ROYAL ACADEMY OF SCIENCES, ETC. ETC. ETC.

THE CRUSTACEA, ARACHNIDES AND INSECTA,

BY P. A. LATREILLE,

MEMBER OF THE ROYAL ACADEMY OF SCIENCES, ETC. ETC. ETC.

TRANSLATED FROM THE FRENCH

WITH NOTES AND ADDITIONS,

BY H. M'MURTRIE, M.D. &c. &c.

IN FOUR VOLUMES, WITH PLATES

VOLUME III.

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PREFACE(1).

Overwhelmed with scientific labours, and yielding, perhaps too easily, to the impulse of friendship and to my desire to serve him, M. Cuvier has confided to me that portion of this work which treats of Insects.

These animals were the objects of his earliest zoological studies, and the cause of his connexion with one of the most celebrated pupils of Linnæus, Fabricius, who in his writings gives him frequent assurance of his high esteem. It was even by various interesting observations on several of these animals—*Journal d'Hist. Nat.*—that M. Cuvier commenced his career in natural history. Entomology, in common with all the other branches of Zoology, has derived the greatest advantage from his anatomical researches, and the happy changes he has effected in the basis of our classification. The internal organization of Insects is now better known, and this study is no longer neglected as was previously the case. He has placed us on the way to the Natural System(1), and greatly will the public regret that his numerous occupations did not allow him to superintend this portion of his treatise on animals.

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(1) This preface is the same which stood at the commencement of the third volume of the first edition of this work. Having there confined myself to an exposition of the general principles, upon which my arrangement of the animals composing the Linnæan class of Insects was effected, and having in the present edition made no change in that respect, the same observations are still applicable. Considered however with regard to the details, or to the secondary and tertiary divisions, that is to say, Orders, Families, Genera and Subgenera, this edition will be found to present a remarkable difference. It was impossible to place it on a level with the actual state of the science, without modifying several parts of my former system, and without considerable additions, which, such has been the progress of Entomology, are so numerous, that even by filling two volumes instead of one, I have been barely enabled to give a very summary view of the multitude of generic divisions effectuated within the last ten years, and which are frequently founded on the most minute characters. This branch of Zoology has gained much from other and more positive sources, those of Anatomy. These observations I was the more imperatively bound to notice, as they formed part of the plan of the illustrious author of the "Règne Animal," and as they serve to confirm the stability of the divisions I have established. By a perusal of the general remarks which precede them, the reader will be better able to appreciate the motives which have determined these changes, and to feel the importance of the addenda that enrich the entomological portion of this edition. A simple comparison between it and that of the former will show, at a glance, that it has been entirely remoulded, or that it is a new work which we now present to the world, rather than a new edition.

Perhaps the desire of associating my name with his in a work like this, which, by the multitude of researches on which it rests, and by their application, has become a precious literary monument of the age, has deceived me and thrown me into an enterprize beyond my powers to accomplish. The responsibility is great, and I have imposed upon myself a task, in which the boldness of the plan is only equalled by the difficulty of its execution. To unite within a very limited space the most interesting facts in the history of Insects, to arrange them with precision and clearness in a natural series, to pourtray with a bold pencil the physiognomy of these animals, trace their distinguishing characters with truth and brevity, in a way proportioned to the successive progress of the science and that of the pupil, to indicate useful or noxious species, and those whose mode of life interests our curiosity, to point out the best sources from which the knowledge of others may be obtained, to restore to Entomology the amiable simplicity which it possessed in the days of Linnæus, Geoffroy, and of the early writings of Fabricius, but still to present it as it now is, or with all the wealth of observation it has since acquired, yet without overloading it; in a word, to conform to the model before me, the work of M. Cuvier, is the end I have striven to attain.

This savant, in his "Tableau Elémentaire de l'Histoire Naturelle des Animaux," did not restrict the extent given by

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(1) Tableau Elément. de l'Hist. Nat. des Animaux, and the Leç. d'Anat. Compar.

Linnæus to his class of Insects; he however made some necessary ameliorations, which have since served as the foundation of other systems. He distinguishes Insects, in the first place, from other invertebrate animals, by much more rigorous characters than those previously employed, viz. *a knotted medullary spinal marrow, and articulated limbs.* Linnæus terminates his class of Insects with those which are apterous, although most of them, such as the *Crustacea* and the *Araneides*, with respect to their organization, are the most perfect of their class or are the most closely approximated to the Mollusca. His method, in this respect, is then exactly the inverse of the natural system, and by transporting the Crustacea to the head of the class, and by placing almost all the Aptera of Linnæus directly after them, Cuvier rectified the method in a point where the series was in direct opposition to the scale formed by Nature.

In his *Leçons d'Anatomie Comparée*, the class of Insects, from which he now separates the Crustacea, is divided into nine orders, founded on the nature and functions of the organs of manducation, the presence or absence of wings, their number, consistence, and the manner in which they are reticulated. It is in fact a union of the system of Fabricius with that of Linnæus perfected.

The divisions made by our savant in his first order, that of the *Gnathaptera*, are nearly similar to those I had established in a Memoir presented to the Société Philomatique, April 1795, and in my *Précis des Caracteres Génériques des Insectes*(1).

M. de Lamarck, whose name is so dear to the friends of natural science, has ably profited by these various labours. His systematic arrangement of the Linnæan Aptera appears to us to be that which approaches nearest to the natural order, and, with some modifications of which we are about to speak, is the one we have followed.

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(1) I there divided the Aptera of Linnæus into seven orders: 1. The SUCTORIA. 2. The THYSANOURA. 3. The PARASITA. 4. The ACEPHALA (*Arachnides palpistes*, Lam.). 5. The ENTOMOSTRACA. 6. The CRUSTACEA. 7. The MYRIAPODA.

I divide the Insects of Linnæus, with him, into three classes: the *Crustacea*, *Arachnides* and *Insecta;* but in the essential characters which I assign to them, I abstract all the changes experienced by these animals, prior to their adult state. This consideration, although natural, and previously employed by De Geer in his arrangement of the Aptera, is not classical, inasmuch as it supposes the observation of the animal in its different ages; it is, besides, liable to many exceptions(1).

The situation and form of the branchiæ, the manner in which the head is united to the thorax, and the organs of manducation, have furnished me the means of establishing seven orders in the class of the Crustacea, all of which appear to me to be natural. I terminate it, with M. de Lamarck, by the *Branchiopoda,* which are a sort of *Crustacea Arachnides.*

In the following class, that of the Arachnides, I only include the species which in the system of Lamarck, compose the order of his *Arachnides palpistes*, or those which have no antennæ. Beyond this, the organization of these animals, external as well as internal, furnishes us with a simple and rigorous rule that is susceptible of a general application.

Their organs of respiration are always internal, receiving air through concentrated stigmata, sometimes possessing functions analogous to those of lungs, and consisting at others of radiated tracheæ, or such as ramify from their base; the antennæ are wanting, and they are usually furnished with eight feet. I divide this class into two orders: the *Pulmonariæ* and the *Trachearïæ.*

Two parallel tracheæ, extending longitudinally through the body, furnished at intervals with centres of branches corresponding to the stigmata, and two antennæ, characterize the class of Insects. Its primary divisions are founded on the three following considerations:

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(1) These considerations, however, have not been overlooked, and I have used them advantageously in grouping families, and arranging them in a natural order, as may be seen by a reference to the historical sketches which precede the exposition of those families. I have even been employed on a work respecting the metamorphosis of Insects in general, which has not yet been published (see article "*Insectes,*" Nouv. Dict. d'Hist. Nat. Ed. 2d), but which I have long been maturing, and which I have communicated to my friends: I have made use of it in the course of my general remarks.

1. *Apterous Insects which either undergo no metamorphoses, or but imperfect ones;* the three first orders.

2. *Apterous Insects which experience complete transformations;* the fourth.

3. *Insects having wings which they acquire by metamorphoses,* either *complete or incomplete;* the last eight.

I begin with the *Arachnides antennistes* of M. de Lamarck, which are comprised in this first division, and which form our three first orders. The second is composed of the fourth order, and contains but a single genus, that of Pulex: it would appear, in some respects, to be allied to the Diptera by means of the *Hippoboscæ;* other characters however, and the nature of its metamorphoses, remove this genus from that of the Hippoboscæ. It is very difficult in some cases to distinguish these natural filiations, and when we are fortunate enough to discover them, we are frequently compelled to sacrifice them to the perspicuity and facility of the system.

To the known order of winged Insects, I have added that of the *Stresiptera* of Kirby, but under a new denomination, viz. that of *Rhipiptera,* as the former appears to me to be founded on a false idea. Perhaps we should even suppress this order, according to the opinion of Lamarck, and unite it with that of the Diptera.

For reasons elsewhere developed(1), and which I could easily strengthen by additional proof, I attach more consequence to characters drawn from the aerial locomotive organs of Insects, and to the general composition of their body, than to the modifications of the parts of the mouth, at least when their structure is essentially referable to the same type. Thus I do not commence by dividing these animals into *Grinders* and *Suckers,* but into those which have wings and wing-cases, and such as have four or two wings of the same consistence. The form and uses of the organs of manducation are viewed

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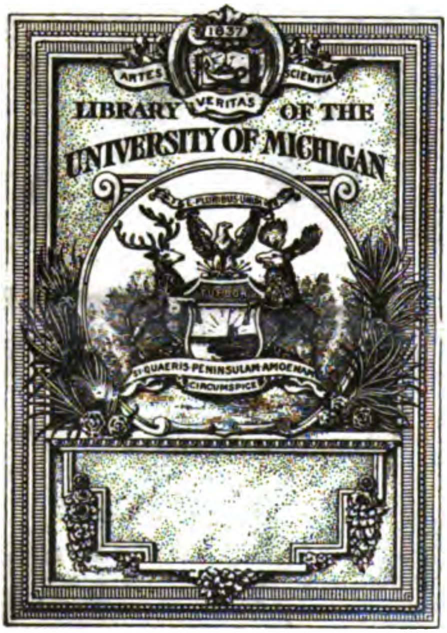
(1) Consid. Génér. sur l'ordre des Crust., des Arach., et des Insectes, p. 46.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THIRD GREAT DIVISION OF THE ANIMAL KINGDOM.

CRUSTACEA, ARACHNIDES, AND INSECTA:

OR ARTICULATED ANIMALS WITH ARTICULATED FEET(1).

These last three(2) classes of the Articulata, which were united by Linnæus under the general name of *Insecta*, are distinguished by at least six(3) articulated feet. Each articulation is tubular, and contains the muscles of the succeeding one, which always moves by gynglymus, that is, in but one direction.

The first articulation, which attaches the foot to the body, and which is composed of two pieces(1), is called the *coxa*, or hip; the following one which is, usually, nearly in a horizontal position, the *femur*, or thigh; and the third, generally vertical, the *tibia* or leg. To these ensues a suite of small ones which touch the ground, forming the true foot, or what is denominated the *tarsus*.

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(1) For the sake of brevity, I have designated them by the term *Condylopes*. This series of articulations, of which their body is composed, has been compared by some Naturalists to a skeleton, or the vertebral column. But the use of this denomination is so much the more fallacious, in as much as these articulations or pretended vertebræ are mere portions of thickened skin, and as this skin is continuous, simply being thinner, and almost membranous at intervals or at the joints. A general character, which serves to distinguish these animals from all other Invertebrata, consists in their *exuviability*, or habit of changing their skin. The situation of the encephalon, pharynx, and eyes, as in the more elevated animals, establishes the limits of the back and abdomen, and of their respective appendages.

(2) Dr Leach forms a separate class of the Myriapoda. The Arachnides Trachearæ, considered anatomically, might also constitute another, but they are so closely allied to the Pulmonariæ in so many other particulars, that we have not thought proper to separate them.

(3) *Hexapoda*. Those which have more than six, are termed by Savigny the *Spiriopoda*. I designate them more precisely by the appellation of *Hyperhexapoda*, (more than six feet).

The hardness of the calcareous or horny(2) envelope of the greater number of these animals, is owing to that of the excretion, which is interposed between the dermis and epidermis, or what is termed in man the *mucous tissue*. This excretion also contains the brilliant and varied colours with which they are so often decorated.

They are always furnished with eyes, which are of two kinds: simple or smooth eyes(3), which resemble a very minute lens, generally three in number, and arranged in a triangle on the summit of the head; and compound eyes, where the surface is divided into an infinitude of different lenses called *facets*, to each of which there is a corresponding filament of the optic nerve. These two kinds may be either united or separated, according to the genera. Whether their functions be essentially different in those cases where they are found to exist simultaneously, is a problem that remains to be solved; but vision is effected in both of them by means differing widely from those which produce it in the eye of the Vertebrata(4).

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(1) In many of the Crustacea the second portion of the coxa seems to form part of the thighs. The tibia, as in the Arachnides, is divided into two joints.

(2) According to M. Aug. Odier, *Mém. de la Soc. d'Hist. Nat.*, 1823, t. I, p. 29 et seq., the substance of this envelope is of a peculiar nature, which he calls *Chitine*. He states that the phosphate of lime forms the great mass of all the salts contained in the teguments of Insects, while that in the shell of the Crustacea is but trifling, though it abounds in the carbonate, which is not found in the preceding animals. Other observations, those of M. Straus in particular, demonstrate that the teguments here replace the skin of the Vertebrata, or that they do not form a true skeleton. Those of M. Odier also militate against all the analogies attempted upon this subject.

(3) *Ocelli stemmata.*

(4) See the Memoir of Marcel de Serres on the simple and compound eyes of Insects, *Montpellier*, 1815, 8vo. Also the observations of M. de Blainville on the eyes of the Crustacea, *Bullet. de la Soc. Philomatique.* We shall return to this subject at another period.

Other organs which for the first time are here presented to us, and which are found in two of these classes, the Crustacea and the Insecta(1), the *antennæ*, are articulated filaments, varying greatly in form, and frequently according to the sex, attached to the head, appearing to be peculiarly devoted to a delicate sense of touch, and perhaps to some other kind of sensation of which we have no idea, but which may refer to the state of the atmosphere.

These animals enjoy the sense of smell and that of hearing. Some authors place the seat of the first in the antennæ(2), others, M. Dumeril for instance, in the orifices of the tracheæ, and Marcel de Serres, &c. in the palpi; neither of these opinions, however, are corroborated by positive and conclusive facts. As to the second, it is only in the Crustacea Decapoda and some few of the Orthoptera, that we can find a visible ear.

The mouth of these animals presents a great analogy, which, according to Savigny(3), and at least with respect to the Hexapoda, extends to those which can only feed by the suction of liquid aliment.

Those called *Tritores* or Grinders (*broyeurs*), on account of their having jaws fitted for triturating their food, always present them in lateral pairs, placed one before the other; the anterior pair are especially called *mandibles;* the pieces which cover them before and behind are named *labia*(1), and the front one, in particular, *labrum*. The *palpi* are articulated filaments attached to the jaws or to the lower lip, and appear to be employed by the animal in recognizing its food. The form of these various organs determines the nature of the regimen with as much precision as the teeth of quadrupeds. The *ligula*, or tongue, commonly adheres to the lower lip(2). Sometimes, in the Apes and other Hymenopterous insects, it is considerably elongated, as are also the jaws, forming a sort of false proboscis (*promuscis*) at the base of which is the pharynx, and frequently covered by a sort of sub-labrum, styled by M. Savigny the *epipharynx*(3). At other times, in the *Hemiptera* and *Diptera*, the mandibles and maxillæ are replaced by scaly pieces in the form of setæ, which are received in an elongated tubular sheath, that is either cylindrical and articulated, or formed with more or less of an elbow, and terminated by a kind of lips. In this case they constitute a true proboscis. In others that also live by suction, the *Lepidoptera*, the maxillæ alone are greatly elongated and united, producing a tubular setiform body, resembling a long, slender, and spiral tongue (or the *spiritrompe*, Lat.); the remaining parts of the mouth are considerably reduced. Sometimes again, as in many of the Crustacea, the anterior feet approach the maxillæ, assume their form, and exercise part of their functions—the latter are then said to be multiplied. It may even happen that the true maxillæ become so much reduced, that the maxillary feet supply their place in toto. Whatever be the modifications of these parts, however, they can always be recognized and referred to a general type(1).

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(1) And even in the Arachnides, but under different forms, and with different functions.

(2) As regards insects, and when they are claviform, or terminate in a club more or less developed, or furnished with numerous hairs. According to M. Robineau Desvoidy, the intermediate antennæ of the Crustacea Decapoda are the olfactory organ, *Bullet. des Sc. Nat.;* but he adduces no one direct experiment in proof of his opinion. It would, if this were so, seem probable that in the highly carnivorous Crustacea, such as the Gecarcini and others, we should find this organ in a comparatively greater state of development, whereas the fact is directly the reverse. His ideas respecting the external composition of the Crustacea Decapoda suppose the existence of a skeleton. He should have commenced, however, by establishing the connexion of these animals with the Fishes, and not by admitting, as a positive fact, what is at least a matter of doubt.

(3) *Mémoire sur les animaux sans vertèbres.* The original idea was thrown out, but undeveloped, in my *Hist. Gen. des Insectes.*

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(1) We here more particularly allude to Insects with six feet, or to the Hexapoda.

(2) Or rather labium, since the other is termed *labrum*. It is protected, before, by a horny production formed by a cutaneous prolongation, and articulated at the base with an inferior portion of the head called the *mentum* or chin. Its palpi, always two in number, are distinguished from those of the maxillæ by the epithet *labial*. When the latter amount to four they are designated as *external* and *internal*; they are considered as a modification of the external and terminal division of the maxillæ. This production, which, in his Ulonatel or the Orthoptera, Fabricius termed the *Galea*, is still the same maxillary division, but more dilated, arched, and fitted to cover the internal division which, here, on account of its scaly consistence and of its teeth, resembles a mandible. In the last insects, and particularly in the Libellulæ, the interior of the buccal cavity presents a soft or vesicular body, distinct from the lip, and which, compared to the Crustacea, appears to be the true tongue—*labium*, Fab. This part is perhaps represented by those lateral divisions of the ligula termed paraglossæ. (See the Coleoptera Carnivora, Hydrophili, Staphylini, the two pencil-shaped pieces that terminate the lip of the Lucani, Apiariæ, &c.) The above mentioned Insects, the Orthoptera and the Libellulæ of Linnæus, evidently demonstrate that this membranous and terminal portion of the inferior lip, which projects more or less between its palpi, and is particularly elongated in several of the Hymenoptera, is very distinct from that internal caruncle which I consider the tongue properly so called; notwithstanding this, nearly all Entomologists designate this external extremity of the lip by the name of *ligula*, or *languette*. To say, however, that the tongue properly so called, is usually so intimately connected with the lip that at the first glance they seem to be confounded, is correct. The pharynx is situated in the middle of the anterior face of this lip a little above its root, and in the Coleoptera provided with paraglossæ, at their point of union. In order to understand well the primitive composition of the under lip, it must be studied in the larvæ, and chiefly in those of the Aquatic Carnivorous Coleoptera. See General Observations on Insects.

(3) There is a membranous production beneath the labrum, in many Coleop-

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tera, which appears to me to be analogous to the epipharynx. The labrum is to it, what the mentum is to the labium.

(1) It is only by a comparative and gradual study of the mouth of the Crustacea, that we can acquire correct and exact ideas respecting the various transformations of these parts, and the means of establishing, if not a certain, at least a probable general concordance between these various organs in the three classes. The mandibles, maxillæ, and the labium, are in fact, a sort of feet appropriated to the masticatory or buccal functions, but susceptible of being so modified as to become organs of locomotion. This principle even extends to the antennæ, or at least to the two intermediate ones of the Crustacea. By adopting it, we are enabled to reduce the composition of these organs to one general type, and we shall hereafter see that, in this respect, neither the Arachnides nor Myriapoda present any anomaly.

CLASS I.

CRUSTACEA.

The Crustacea are articulated animals, with articulated feet, respiring by means of branchiæ, protected in some by the borders of a shell, and external in others, but which are not inclosed in special cavities of the body, and which receive air from openings in the surface of the skin. Their circulation is double, and analogous to that of the Mollusca. The blood is transmitted from the heart, which is placed on the back, to the different parts of the body, whence it is sent to the branchiæ, and thence back again to the heart(1). These branchiæ, sometimes situated at the base of the feet, or even on them, and at others on the inferior appendages of the abdomen, either form pyramids composed of laminæ in piles, or bristled with setæ or tufted filaments of simple ones, and even appear in some cases to consist wholly of hairs.

Some of the Zootomists, Baron Cuvier in particular, had already made known to us the nervous system of various Crustacea of different orders. The same subject has lately been thoroughly examined by Messrs Victor Audouin and Milne Edwards in their third Memoir on the Anatomy and Physiology of these animals—Ann. des Sc. Nat. XIV, 77,—and all that is now wanting to complete their researches, is the publication of those made by M. Straus on the Branchiopoda and the Limuli in particular, which they have not noticed.

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(1) See the order Decapoda.

"The nervous system of the Crustacea submitted to our observation, say they, presents itself in two very different aspects, which constitute the two extremes of the modifications visible in that class. Sometimes, as in the Talitrus, this apparatus is constituted by numerous similar nervous inflations, arranged in pairs, and united by cords of communication in such a way as to form two ganglionic chains, separated from each other and extending throughout the length of the animal. At others, on the contrary, it is solely composed of two ganglions or knotty enlargements, dissimilar in form, volume, and arrangement, but always simple and azygous, and situated, one in the head and the other in the thorax. Such is the case in the Maia.

"These two modes of organization, at the first glance, certainly seem essentially different, and if the study of the nervous system of the Crustacea were limited to these two animals, it would be extremely difficult to recognize the analogy between the central nervous mass in the thorax of the Maia, and the two ganglionic chains which occupy the same region of the body in the Talitrus. But if we remember the various facts detailed in this memoir, we necessarily arrive at this remarkable result."

They were led to it by the exact and careful study of the nervous system of various intermediate Crustacea, forming so many links of the series, such as the Cymothoæ(1), the Phyllosomæ(2), Astacus(3), Palæmon and Palinurus. They have also supported their positions by the observations of Cuvier and those of M. Treviranus. The consequence deduced by them is, that notwithstanding this difference, the nervous system of the Crustacea is formed of the same elements, which, insulated in some and uniformly distributed throughout the length of the body, present in others, various degrees of centralization, at first from without inwardly, and then in a longitudinal direction; and that finally, this approximation in all directions is carried to its extreme point, when it is reduced to a single nucleus in the thorax—as in Cancer properly so called, or the Brachyura. Of all the Decapoda Macroura examined by Messrs Audouin and Edwards, the Palinurus was found to have the venous system most centralized; and in fact, that animal in our system is but little removed from the Brachyura. But this should not be the case with Palæmon and the Astacini, for according to them the former approximates more closely in this respect to Palinurus than the latter, while in our arrangement the second precede the first, a disposition which appears to us to be founded on several very natural characters.

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(1) Isopoda.

(2) Stomapoda.

(3) For this subgenus and the two following subgenera see the Decapoda Macroura.

The Crustacea are apterous or deprived of wings, furnished with compound eyes, though rarely with simple ones, and usually with four antennæ. They have mostly—the Pæcilopoda excepted—three pairs of jaws, the two superior ones, designated by the name of mandibles, included; as many foot-jaws(1), the last four of which, however, in a great many instances, become true feet; and ten feet properly so called, all terminated by a single small nail. When the last two pairs of foot-jaws exercise the same functions, the number of feet is increased to fourteen. The mouth, as in insects, presents a labrum and a ligula, but no lower lip properly so called, or comparable to that of the latter; the third pair of foot-jaws, or the first, closes the mouth externally, and replaces that part.

The sexual organs, at least those of the males, are always double, and situated on the breast or at the inferior origin of that posterior and abdominal portion of the body commonly called the tail, and never posteriorly. Their envelope is usually solid, and more or less calcareous. They change their skin several times, and generally preserve their primitive form and natural activity. They are mostly carnivorous and aquatic, and live several years. They do not attain their adult state until after casting their skin a certain number of times. With the exception of a few in which these changes somewhat influence their primitive form and modify or augment their locomotive organs, they are at birth, size apart, such as they are always to remain.

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(1) *Auxiliary jaws*, as they are termed by M. Savigny, at least when speaking of the Crustacea Decapoda. As the two superior ones, in the Amphipoda and Isopoda, form a sort of lip, he there calls them the *auxiliary lip*. He distinguishes the jaws in Phalangium, a genus of Arachnides, as *principal jaws;* those which are attached to the palpi—*false palpi*, according to him; and as *supernumerary jaws*, those which are attached to the first four feet. Those parts of the same animals which have been considered as mandibles, are his *mandibules succédanés*. He admits of two auxiliary lips in the Scolopendræ.

Division of the Crustacea into Orders.

The situation and form of the branchiæ, the mode in which the head is articulated with the trunk(1), the mobility or fixedness of the eyes(2), the organs of manducation, and the teguments, constitute the basis of our divisions, and give rise to the following orders(3).

We divide this class into two sections, the MALACOSTRACA, and the ENTOMOSTRACA(4).

The first are usually furnished with very solid teguments, of a calcareous nature, and with ten or fourteen feet(5), generally unguiculated. The mouth, situated in the ordinary place, is composed of a labrum, tongue, two mandibles (frequently furnished with palpi), and two pairs of maxillæ covered by the foot-jaws. In a great number each eye is placed on an articulated and movable pedicle, and the branchiæ are concealed under the lateral margins of the upper or lower shell; in the others they are usually placed under the post-abdomen. This section consists of five orders: the Decapoda, Stomapoda, Læmodipoda, Amphipoda, and the Isopoda. The four first embrace the genus Cancer of Linnæus, and the last his Oniscus.

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(1) With respect to *this* term, and that of *thorax*, which are frequently employed in an arbitrary manner, *see* our general observations on the class of Insects.

(2) These organs are either pediculated and movable, or sessile and fixed. It is from this character that Lamarck has divided the Crustacea into two great sections, the *Pediocles* and the *Sessiliocles*; for which denominations, but restricting its application to the Malacostraca, Doctor Leach has substituted those of Podopthalma and Edriopthalma. Gronovius was the first who had recourse to this distinction.

(3) Although we possess but few observations on the nervous system of the Crustacea, all those which have been made support the truth of our divisions.

(4) They might be still further divided into the *Dentata* and the *Edentata*, according to the presence or absence of the mandibles. Jurine, Jun., has already proposed these divisions in his excellent Mémoire sur l'Argule foliacé.

(5) The four anterior, when there are fourteen, are formed by the last four posterior foot-jaws. In the Decapoda, the six foot-jaws belong to the mouth, and perform the office of maxillæ.

The second, the Entomostraca, or "Insects with shells" of Muller, is formed of the genus Monoculus, Lin. Here the teguments are horny and very thin, while a shell, resembling a buckler, composed of from one to two pieces, covers or incloses the body of the greater number. The eyes are almost always sessile, and frequently there is but one. The feet, the number of which varies, are mostly fitted for natation, and without a terminal nail. Some of them, having an anterior mouth composed of a labrum, two mandibles—rarely furnished with palpi, a tongue, and one, or at most two pairs of jaws, of which the external ones are naked or are not covered by the foot-jaws, approximate to the preceding Crustacea. In the other Entomostraca, which seem to approach the Arachnides in several particulars, the organs of manducation are sometimes simply formed by the coxæ of the feet, projecting and arranged like lobes bristling with small spines round a large central pharynx. At others they either compose a little siphon or beak, used for suction, as in several Arachnides and Insects, or they are wholly (or nearly so) invisible externally, either because the siphon is internal, or because the suction is produced in the manner of a cup.

The Entomostraca are thus dentated or edentated. The first will form our order of the Branchiopoda(1), and the second that of the PÆCILOPODA, which in the first edition of this work were a mere section of the preceding order.

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(1) In my work entitled *Familles Nat. du Regne Animal*, the Entomostraca are divided into four orders: the Lophyropoda, Phyllopoda, Xiphosura, and the Siphonostoma.

The singular fossils called TRILOBITES, of which M. Brongniart has given an excellent Monograph, being considered by him, as well as by many other naturalists, as Crustacea allied to the Entomostraca, we will briefly speak of them after we have done with the latter.

FIRST GENERAL DIVISION.

MALACOSTRACA.

The Malacostraca naturally divide themselves into those whose eyes are placed on a movable pedicle, and those in which they are sessile and fixed.

a. Eyes placed on a movable and articulated pedicle.

Eyes(1) placed on a movable pedicle composed of two articulations, and received into fossulæ, distinguish the Decapoda and Stomapoda from all the others. Anatomically considered, they appear to be still further removed from them,—Leçons d'Anat. Compar., Cuv.; Ann. des Sc. Nat., t. XI,—inasmuch as they are the only ones that present sinuses in which the venous blood is collected previous to its transmission to the branchiæ on its return to the heart.

The Decapoda and Stomapoda resemble each other in several characters common to both. A large plate called a shell covers a greater or less extent of the anterior portion of their body. They all have four antennæ(2), the middle ones of which are terminated by two or three filaments; two mandibles, each of which, at its base, bears a palpus that is divided into three joints and usually laid on it; a bilobate tongue; two pairs of jaws; six foot-jaws, the four posterior of which, in some, are transformed into claws; and ten feet, or fourteen, in those where the four foot-jaws have that form.

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(1) Behind the cornea, according to Blainville, is a choroides perforated with numerous holes; then a true crystalline, resting on a nervous ganglion, and divided into a multitude of little fasciculi.

(2) We must distinguish the peduncle—*stipes*,—and the stem—*caulis*, *funiculus*. The peduncle is thicker, cylindrical, and composed of three joints, a number which seems peculiar to these organs in their imperfect or rudimentary state. The stem is setaceous, and divided into a variable number of very small joints. That of the external antennæ is simple, but that of the interior ones consists of at least two filaments, and in several of the Decapoda Macroura, of three. Passing gradually from these latter to the Brachyura, the antennæ become shortened, so that, in several of the Quadrilatera, the lateral ones, at least, are very small. In this case the two terminal divisions of the intermediate ones form a sort of bifurcated forceps, or unequal and articulated fingers.

In the greater number the branchiæ, of which there are seven pairs, are concealed under the lateral margin of the shell: the two anterior pairs are situated at the origin of the four last foot-jaws, and the others at that of the feet properly so called. In the other Crustacea they are annexed, in the shape of tufts, to five pairs of paddles (feet) placed under the post-abdomen. The under part of this posterior portion of the body is similarly furnished, in the others, with four or five pairs of bifid appendages.

ORDER I.

DECAPODA.

The head, in the Decapoda, is closely joined to the thorax, and covered with it by a shell, entirely continuous, but that most frequently exhibits deep lines dividing it into various regions which indicate the places occupied by the principal internal organs(1). The mode of their circulation presents characters which distinguish them from the other Crustacea.

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(1) M. Desmarest, in his *Histoire Naturelle des Crustacés Fossiles*, and in his *Considérations Générales sur la Classe des Crustacés*, has presented us, in relation to this point, with an ingenious nomenclature, based on the concordance of the portions of the external surface of the shell with the organs they cover. But, in addition to the fact that the shell of several Decapoda presents no impressions, or has them nearly obliterated, these denominations may be replaced by others more simple, more familiar, and relating to these same organs; as the middle or centre, the anterior and posterior extremities, the sides, &c.: it appears useless to increase our nomenclature in this case.

The circumscribed heart(1), of an oval form and with muscular parietes, gives origin to six trunks of vessels, three of which are anterior, two inferior, and the sixth posterior. Of the three anterior arteries, the median—*the ophthalmic*—is distributed almost exclusively to the eyes; the two others—*the antennaries*—spread over the shell, the muscles of the stomach, a portion of the viscera and the antennæ; the two inferior ones—*the hepatics*—transmit blood to the liver; the last—*the sternal*—is the most voluminous of the three, and arises from the posterior part of the body, sometimes on the right side and at others on the left; its chief course is to the abdomen, and to the organs of locomotion. It gives origin to a great number of large vessels, among which we should particularly observe the one called by M. Audouin and Edwards the *superior abdominal,* because it arises from the posterior part of that artery, at a short distance before the articulation of the thorax with the abdomen, vulgarly termed the tail, and because it soon dips into the abdomen—*tail,*—where it divides into two large branches, running backwards, becoming gradually smaller and terminating at the anus. The blood which has nourished these various organs, and thus become venous, collects from all quarters in two large sinuses(2), one on each side and above the feet, and formed of venous sacs united in a longitudinal series, or like a chain. It is thrown into an external vessel—*efferent*—of the branchiæ, where it is renewed and becomes arterial; thence proceeds into an internal vessel—*afferent*; and finally seeks the heart through canals—*branchio-cardiac*—laid beneath the arch of the flanks. All the canals of a side unite in one large trunk, and open into the lateral and corresponding part of the heart by a single orifice, the folds of which form a double valve that opens to allow the transit of the blood from the branchiæ to this viscus, but prevents a retrograde motion by closing. Examined internally, the heart exhibits numerous fasciculi and muscular fibres, variously intercrossed and forming several small chambers before the orifices of the arteries. These chambers are so many small auricles, which communicate freely with each other when it dilates, but appear to form a similar number of little cells for each vessel when it contracts, their capacity being proportioned to the quantity of blood in their peculiar vessels. These vessels debouche in the interior of the heart by eight openings, the two lateral valvular ones above mentioned included. Such, with the exception of some modifications(1), is the general system of the circulation in the Decapoda.

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(1) These observations are extracted from the excellent Memoir of Messrs Audouin and Edwards, published in the *Ann. d'Hist. Nat.*, t. XI, 283—314, and 352—393. See also the *Mém. du Mus. d'Hist. Nat.*, where M. Geoffroi Saint-Hilaire has inserted the results of his curious researches on the solids, and on the circulation of the Lobster.

(2) These learned naturalists compare them to the two lateral hearts of the Cephalopoda, and the analogy has been admitted by Baron Cuvier in his general Report on the transactions of the Acad. Roy. des Sc., for 1827; but the idea had been communicated by me to M. Audouin, and was a necessary consequence of my theory of the circulation of the blood in the Crustacea, published in a note of my *Esquisse d'une Distribution Generale du Règne Animal*, p. 5. As the writers alluded to have taken no notice of what I have stated in this particular, both in the pamphlet quoted, and in my work on the "Families of the Animal Kingdom," I beg leave to produce that note. "I submit the following opinion to the judgment of Zootomists, and of M. Cuvier in particular, viz. that in those of the Vertebrata possessed of a circulation, the organ called *heart* represents, in its functions, a left ventricle, the arterial and dorsal trunk of Fishes and of the larvæ of the Batrachians; that one or two arteries, which in the Cephalopoda have the form of

The superior face of the brain(2) is divided into four lobes, each of the two middle ones furnishing from its anterior margin an optic nerve that plunges directly into the pedicle of the eye and there divides into numerous filaments, each of which is destined to a facet in the cornea of that organ.

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hearts, replace the right ventricle. The focus of the circulation, highly concentrated in the first of the Vertebrata, thus becomes gradually weaker, so that finally there is no circulation whatever. The dorsal vessel of Insects would then be the mere rudiment of the heart of the Mollusca and Crustacea." I will add, that twenty-five years ago, in my *Hist. Nat. des Crust. et des Insectes*, I rectified the error of Rœsel respecting the nervous cord of the spinal marrow, which had been taken for a vessel.

(1) See general observations on the family of the Macroura.

(2) These observations are extracted from the *Leçons d'Anatomie Comparée* of Baron Cuvier. For other details and particular facts see the Memoir of Messrs Audouin and M. Edwards, loc. cit.

The inferior face of the brain produces four nerves, which belong to the antennæ, and that also give off some twigs to the neighbouring parts. Two nervous and very long cords, embracing the esophagus laterally and uniting beneath it, arise from its posterior margin. There, as in the Brachyura, this union only takes place in the middle of the thorax, the medulla then assuming the form of a ring whose proportions are eight times larger than those of the brain: six nerves on each side arise from this ring; the anterior ones belong to the parts of the mouth, and the five others to the five feet of the same side. From the posterior margin arises another nerve which runs to the tail, without producing any sensible ganglion, and that apparently represents the ordinary nervous cord. Here, as in the Macroura, each of the two nervous cords, previous to uniting beneath the esophagus, and at about the middle of its length, gives off a thick nerve for the use of the mandibles and their muscles. United, they form a first—*sub-cervical*—ganglion that distributes nerves to the maxillæ and the foot-jaws(1); they afterwards continue approximated throughout their length, presenting eleven successive ganglions, each of the five first furnishing nerves to as many pairs of feet, and the remaining six those of the tail; that of the Pagurus has some ganglions less, thus appearing to form the passage from the Brachyura to the Macroura. M. Serres thinks that he has recognized in these Decapoda, vestiges of the great sympathetic(2).

The lateral margin of the shell is bent under, to cover and protect the branchiæ, leaving an opening anteriorly for the passage of water. Sometimes,—see *Dorippe*—the posterior and inferior extremity of the thorax has two peculiar apertures for that purpose. The branchiæ are situated at the origin of the last four foot-jaws and feet; the four anterior ones have less extent. The six foot-jaws are all of a different form, are applied to the mouth, and divided into two branches, the exterior of which resembles a small antenna, formed of a pedicle, and a setaceous and pluri-articulate stem—it has been compared to a whip, *palpus flagelliformis*(1). The two anterior feet, and sometimes the two or four following ones, are in the form of claws. The penultimate joint is dilated, compressed, and in the form of a hand; its inferior extremity is lengthened into a conical point, representing a sort of finger, opposed to another formed by the last joint, or the tarsus proper. This one(2) is movable, and has received the name of thumb—*pollex;* the other is fixed, and considered as the index—*index*. These two fingers are also called *mordaces*. The last is sometimes very short, and has the form of a simple tooth; in this case the other is bent underneath. The hand with the fingers constitutes our forceps properly so called. The preceding, or antepenultimate joint is termed *carpus*.

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(1) According to M. Straus, the anterior division of the body of the Limuli, that which is covered by a semi-lunar buckler, presents, besides the brain, no other ganglion but this, whence we may infer that the inferior organs of locomotion correspond to the parts of the mouth in the Decapoda, Stomapoda, and even in the Arachnides, and that those of the other division of the body, or of the second buckler, are analogous to the feet of the same Decapoda.

(2) Messrs Audouin and Edwards have observed in the Maia and in the Palinurus a nerve analogous to the one called by Lyonet, in his *Anatomie de la Chenille du Saule*, "recurrent." The discovery of the other gastric nerves is also due to them.

The respective proportions and the direction of the organs of locomotion are such, that these animals can walk sideways or backwards.

With the exception of the rectum, which opens at the end of the tail(3), all the viscera are contained in the thorax, so that this portion of the body represents the thorax and the greater part of the abdomen of insects. The stomach, supported by a cartilaginous skeleton, is armed internally with five bony and notched appendages, which completes the trituration of the aliment. In it, in the moulting season, which arrives near the end of spring, we observe two calcareous bodies, round on one side and flat on the other, commonly called *crabs' eyes*, that disappear after the change is completed, thereby inducing us to believe that they furnish the material for the renewal of the shell. The liver consists of two large clusters of blind vessels, filled with a bilious humour, which they pour into the intestine, near the pylorus. The alimentary canal is short and straight. The flanks present a range of holes situated immediately at the insertion of the branchiæ, but which can only be seen by removing those organs. The under shell, viewed internally, at least in several large species, exhibits transverse cells formed by crustaceous laminæ, and separated in their middle by a longitudinal range of the same nature.

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(1) There is a long, tendinous and hairy lamina at its base.

(2) The hand being placed on its edge, the finger is uppermost.

(3) This suite of segments which, in the Crustacea of the first orders, immediately succeed those to which the five last pairs of feet are attached, compose what I have termed the *post-abdomen*. The appellation of tail usually affixed to it, and which, in order to accommodate ourselves to common parlance, we have retained, is very improper; it can only apply to the posterior terminal appendages of the body which extend considerably beyond it. See my Fam. Nat. du Regne Anim., p. 255, et seq.

The sexual organs of the male are situated near the origin of the two posterior feet. Two articulated pieces, of a solid consistence, and resembling horns, stylets, or setaceous antennæ, placed at the junction of the tail with the thorax and replacing the first pair of subcaudal appendages, are regarded as the male organs of copulation, or at least as their sheaths. But, according to our observations on various Decapoda, each of them consists of a little membranous body, sometimes setaceous, and at others filiform or cylindrical, that projects from a hole situated at the articulation of the hip of the two posterior feet, with the lower shell. The two vulvæ are placed on this piece, between those of the third pair, or on their first joint, a disposition depending on the widening and narrowing of the lower shell. Copulation takes place, *ventre a ventre,* These animals grow but slowly, and live a long time. It is among them that we find the largest and most useful species, but their flesh is not easily digested. The body of some Palinuri attains the length of a metre. Their claws are efficacious weapons, and have such power in large individuals, that they have been seen to seize a Goat, and drag it from the shore.

They usually inhabit water, but do not instantly perish when deprived of it; some species even pass a part of their lives on land, only visiting the water in the nuptial season, and for the purpose of depositing their spawn. Even they are compelled to fix their domicil either in burrows, or in cool, damp places. The Decapoda are voracious and carnivorous. Certain species even penetrate into cemeteries, and devour the dead. Their limbs are regenerated with surprising promptitude, but it is requisite that the fracture be at the junction of the articulations, and when accident determines it otherwise, they know how to apply a remedy. When they wish to change their skin, they seek a retired and solitary spot, in order to be sheltered from their enemies, and to remain at rest. When the change is effected, their body is soft, and has a more exquisite flavour. A chemical analysis of the old shell proves it to be formed of the carbonate and phosphate of lime, united in different proportions with gelatine. On these proportions depends the solidity of the shell: it is much less thick and flexible in the latter genera of this order, and further on, it becomes almost membranous. M. de Blainville has observed that the shell of the Palinurus is composed of four superincumbent layers, the superior and two inferior of which are membranous; the calcareous matter is interposed between them, forming the fourth. Exposed to heat, the epidermis becomes of a more or less vivid red, the colouring principle being decomposed by boiling water; other combinations of this principle produce, in some species, a very agreeable mixture of colours, that frequently border on blue or green.

The greater number of fossil Crustacea hitherto discovered belongs to the order of the Decapoda. Among those of Europe, the oldest approach to species now living in the vicinity of the tropics; the others, or more modern ones, are closely allied with the living species of Europe. The fossil Crustacea of the tropical regions, however, appear to me to bear the closest similitude to several of those now found there in a living state, a fact of much interest to the geologist, should the study of the fossil shells of those countries, collected from the deepest strata, furnish a similar result.

FAMILY I(1).

BRACHYURA.—KLEISTAGNATHA, Fab.

Tail shorter than the trunk, without appendages or fins at the extremity, and doubled under, in a state of rest, when it is received in a fossula on the chest. Triangular in the males, and only furnished at base with four or two appendages, in the form of horns, the superior of which are the largest, it becomes widened, and convex in the females(2), presenting beneath four pairs of double hairy filaments(3), destined to support the ova, and analogous to the sub-caudal natatory feet of the Macroura, and others.

The vulvæ are two holes situated under the pectus, between the third pair of feet. The antennæ are small: each of the intermediate ones, usually lodged in a fossula under the anterior edge of the shell, terminates in two very short filaments. The ocular pedicles are generally longer than those of the Decapoda Macroura. The auricular tube is almost always stony. The first pair of feet terminate in a forceps or claw. The branchiæ are disposed on a single range, in the form of pyramidal ligulæ, composed of a multitude of leaflets piled one on another, in a direction parallel to their axis. The foot-jaws are generally shorter and broader than in the other Decapoda, the two external ones forming a sort of lip(1). Their nervous system also differs from that of the Macroura(2).

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(1) The sections thus named are based on an ensemble of important anatomical characters, and generally correspond to the Linnæan genera, and sometimes also to those established by Fabricius in his earlier works. These families are more extensive than the sections thus named in my other writings: but if they be considered as first divisions of orders, and if what I have termed tribes be considered as families, it will be seen that the method is essentially the same. There is, then, the opinions of others to the contrary notwithstanding, no real discrepance in this respect. On the same principle, the subgenera, with the exception of some whose characters are too minute or too slightly marked, will become genera in a more detailed and special system.

(2) The apparent number of segments, which is usually seven, sometimes also varies according to the sex; it is less in the females. Dr Leach has made great use of this consideration, which appears to us of but little importance, and opposed to the natural order.

(3) Several of these filaments exist in the males, but in a rudimental state.

This family, as in several of the systems anterior to the distribution of these animals by Daldorf, might constitute but one genus, that of

Cancer, Lin.

In the greater number, all the feet are attached to the sides of the pectus, and are always exposed; this is the case in the first five sections. The first, or that of the Pinnipedes(3), to this character, adds that of having the last feet, at least, terminated by a very flat or fin-like joint that is oval or orbicular and broader than the same joint of the preceding feet, even when they also are shaped like a fin. They seldom frequent the coast, and are generally found in the high

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(1) Those of the Macroura are longer and narrower. It is on this difference that Fabricius established his order of the *Exochnata*.

(2) See general observations on the Decapoda.

(3) This systematic arrangement of the Brachyura is artificial, or but little natural in some respects; in consequence of which, we have somewhat altered it in our *Familles Naturelles du Règne Animal*. The Quadrilatera compose our first tribe, at the head of which are the *Ocypoda* and other Land-Crabs, ending with the River-Crabs, or the *Telphusæ*. The Arcuata form the second. That of the Cryptopoda appearing to us more closely allied to the preceding one than the Triangularia, will immediately follow, and be the third, and not the fourth, as in this method. Immediately after the Arcuata we will place those genera whose claws are in the form of a crest, whose lateral antennæ are always very short, and the third articulation of whose foot-jaws is triangular, and frequently entire, or without any emargination; such are the *Hepati*, *Matutæ*, *Ovithyiæ*, and *Mursiæ*.

Brachyura, approaching the latter in the form of the same articulation, but whose claws differ, and where the lateral antennæ are salient, advanced, and frequently hairy, such as the *Thiæ*, *Pirimelæ*, and *Atelecycli*, will immediately precede these latter subgenera. As the Telphusæ seem to be connected with the Eriphiæ and the Pilumni, and as from these we naturally pass to Cancer properly so called, or the Cancer, Fab., it follows that the Portuni and other natatory Arcuata should be at the head of this tribe. Then follow the Orbicularia, the Triangularia, and the Notopoda. But of these the *Dromiæ* and the *Dorippes* should be placed higher in the scale. The *Homolæ*, *Lithodes*, and *Raninæ*, appear to me to be of all the Brachyura, those which are most closely allied to the Macroura. The external foot-jaws of the Homolæ and of the Lithodes greatly resemble those of the Macroura by their length and projection.

Although we have divided the Decapoda into two genera only, in order to conform to modern systems, and to diminish the number of subgenera, our sections may be converted into tribes, corresponding to as many subgenera, to be afterwards divided into various subgeneric sections.

seas. With the exception of the Orithyiæ, we observe but five distinctly marked segments in the tail of the males, while that of the females presents seven. We will begin with those in which all the feet, except the claws, are natatory.

Matuta, Fabr.

The Matutæ have an almost orbicular shell armed on each side with a very stout tooth in the form of a spine; the superior edge of the hands dentated like a crest, and their external face studded with pointed tubercles; the third joint of the external foot-jaws, without any apparent emargination, terminates in a point, so that it forms, with the preceding joint, an elongated and almost right-angled triangle. The external antennæ are very small, and the ocular pedicles slightly arcuated.

De Geer mentions a species—*Cancer latipes*, which he says is from the American seas, and has its front terminated by a straight and entire margin. All those we have seen, however(1), were brought from the East, and the middle of that margin always presents a bidentated or emarginated projection. The

Polybius, Leach,

Is allied to the Portuni, but the shell is proportionably narrower and more rounded; the sides are merely furnished with ordinary teeth. The third joint of the external foot-jaws is obtuse and emarginated. The eyes are much thicker than their pedicles, and globular.

But a single species is as yet known(2); it was found on the coast of Devonshire, and has also been observed by M. D'Orbigny on the sea-coast of the western departments of France(3).

In all the following swimmers, the two posterior feet only are formed like fins(4).

We may first separate those whose shell is almost ovoid and trans-

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(1) *M. victor*, Fab.; Herbst., VI, 44.—*M. planipes*, Fab.; Herbst., xlviii, 6; *M. lunaris*, Leach, Zool. Miscell., cxxvii, 3—5, var.;—*M. Peronii*, Ib., tab., ead., 1—2. Perhaps we should refer the fossil species called by M. Desmarest, *Portune d'Héricart*, Hist. Nat. des Crust., Foss. V, 5, to this genus, or the MURSIA, Leach.

(2) *Polybius Henslowii*, Leach, Malac. Brit., IX; B.

(3) The tarsi of the intermediate feet of the Portumni, Leach, are almost compressed into a fin; they might be placed after the Polybii.

(4) Always wider and more oval than the preceding tarsi.

versely truncated before, and where the tail of the males (the only sex known) consists of seven distinct segments. Such is the

Orythyia, Fabr.

The only species known,—*Orith. mamillaris*, Fabr., *Cancer bimaculatus*, Herbst., XVIII, 101, is found in the sea of China, or at least forms a part of the collections of Insects sold by its inhabitants to foreigners. The ocular pedicles are longer in proportion than those of the Portuni.

The shell of the last swimmers is much wider before than behind, forming either the segment of a circle narrowed towards the tail and truncated, or a trapezium, or is almost in the shape of a heart. Its greatest transverse diameter generally surpasses the opposite one. There are but five segments in the tail of the males, instead of the seven found in that of the females, the number usually peculiar to the tail of the Decapoda; the third and the two following ones are confounded or form but one; frequently, however, traces of them are discovered, at least on the sides.

We will first separate those whose eyes are supported by very long and slender pedicles, arising from the middle of the anterior margin of the shell, extending to its lateral angles, and received into a groove run under the edge. Such is the

Podophthalmus, Lam.,

Where the shell forms a transverse trapezium, wider and straight before with a long spiniform tooth behind the ocular cavities. The claws are elongated, spiny, and similar to those of most of the species of the genus Lupa, Leach.

The only living species known(1) inhabits the coasts of the Isle of France and those of the neighbouring seas.

The valuable cabinet of one of the most learned fossil conchylidogists of Europe, contains an internal cast of a fossil Podophthalmus, to which M. Desmarest has affixed the name of its possessor, M. de France(2).

The ocular pedicles of the other Crustacea, belonging to this section, are short, occupy but a very small portion of the transverse diameter of the shell, are placed in oval cavities, and resemble, generally, those of the ordinary Crabs with which these swimmers are almost insensibly connected. They may all be united in one single subgenus, that of

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(1) *Podophthalmus spinosus*, Latr., Gener. Crust. et Insect., I, 1, and II, 1; Leach, Zool., Miscell. cxlviii; *Portunus vigil*, Fab.

(2) Hist. Nat. des Crust. Foss., V, 6, 7, 8.

PORTUNUS, Fab.

Certain species(1) peculiar to the Indian Ocean, such as the *Admete*, Herbst., LVII, 1, are distinguished from all the following ones by their shell, which is of a transversely quadrilateral form, narrowed posteriorly, and whose ocular cavities occupy its anterior lateral angles; the eyes are thus separated by an interval almost equal to the greatest width of the shell. The insertion of the lateral antennæ is at a considerable distance from these cavities.

Other species, whose shell forms the segment of a circle, posteriorly truncated and widest in the middle, are remarkable for the length of their claws, which is at least double that of the shell. Each side presents nine teeth, the posterior largest and spiniform. The tail of the males is frequently very different from that of the females.

These Portuni constitute the genus LUPA, Leach, and are mostly of a large size and foreign to Europe. One species, however, is found in the Mediterranean(2).

A third division will consist of species analogous to the last in the form of their shell, but whose lateral teeth, usually five in number, are nearly equal, or where, at least, the posterior tooth differs but slightly from the preceding ones; the length of the claws does not much exceed that of the shell.

Those which have from six to nine teeth on each side are exotic. The *Portunus tranquebaricus*, Fabr., Herbst, Canc., XXXVIII, 3, is the only one known that has nine equal teeth on each lateral edge; it is large, and is much esteemed as food. We suspect the *P. leucodonte*, Desmar., Hist. Nat. des Crust. Foss., VI, 1—3, is the same species in a fossil state; it is also from India.

The following species, all from European seas(3), have five teeth on each lateral edge of the shell.

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(1) Genus THALAMITA, Lat.

(2) *Portunus Dufourii*, Latr., Nouv. Dict. d'Hist. Nat., Ed. II. This species, figured in the Dict. Class. d'Hist. Nat., closely approaches the *Cancer hastatus*, Lin., which he says is found in the Adriatic. The following are to be referred to the same division: *Cancer pelagicus*, Herbst., lviii, 55;—*C. forceps*, Id., lv, 4; Leach, Zool. Miscell., liv;—*C. sanguinolentus*, Herbst., VIII, 56, 57;—*C. cedonulli*, Id., xxxix;—*C. reticulatus*, Ib., 1;—*C. hastatus*, Ib., lv, 1;—*C. menestho*, Ib., 3;—*C. ponticus*, Ib. 5.

(3) For the Mediterranean species see Petagna, Risso and Olivi; for those on the western coast of France and the British seas, the *Catalogue Méthodique des Crus-*

P. puber, Fab.; *Cancer puber*, L.; Penn. Brit. Zool., IV, iv, 8; Herbst., VII, 59; Leach, Malac. Brit., VI. Covered with a yellowish down; eight small teeth between the eyes, the two middle ones longest, obtuse and divergent; claws sulcated, armed with a stout dentated tooth on the inner side of the carpus, and from one joint to the following one or the hand; fingers blackish.

This species is usually called in France, where its flesh is considered a delicacy, *l'Etrille.*

P. corrugatus; Cancer corrugatus, Penn. Brit. Zool., IV, pl. v, 9; Leach, Malac. Brit., VII, 1, 2. The shell rugose, covered with a yellowish down, and furnished with three equal, and almost lobuliform teeth in front; the three posterior teeth of the lateral margins very sharp and spiniform.

P. mœnas; Cancer mœnas, L., and Fab. This common species of the French coast, called *Crabe enragé*, appears to me to belong to the Portuni, rather than to the Crabs properly so called; its posterior fins are only somewhat narrower. Such was the first opinion of Dr Leach, who subsequently made a peculiar genus for it called Carcinus, (Malac. Brit., XII, tab. v). It also has five teeth on each side, and a similar number in front, the internal oculars included. The top of the shell is glabrous, finely shagreened, with deeply impressed lines. The tarsi are striate; the upper edge of the hand is so compressed as to form a rounded ridge, terminated by a small tooth; a second but stronger one is observed on the inner side of the preceding joint; fingers striate, and almost equally dentated, with a blackish tip.

A fossil species is found in the marly limestone of Monte-Bolca, which, according to Desmarest,—Hist. Nat. des Crust. Foss., p. 125, is closely related to the mœnas.

In the *Portunus Rondeletii*, Risso, there are no teeth in front. The one he calls *longipes*, presents the same character, but its feet are longer in proportion than those of other analogous species.

We will form a fourth division with the subgenus.

Platyonichus, Lat.

Which name has replaced that of *Portumnus*, Leach, on account

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tacés du departement du Calvados," by Brebisson, and especially the excellent work of Dr Leach, *Malacostraca Podophthalmia Britanniæ*. M. Desmarest has well developed the system of this author in his *Considérations Générales sur les Crustacés*, an extremely useful book to those who make this branch of Zoology their study. See also our article *Portune*, Encyc. Methodique.

of the too great similarity between the latter and the word *Portunus* already adopted. Here the shell is at least as long as it is broad and almost cordate. All the tarsi of the feet, the claws excepted, terminate in a small, semi-elliptical, elongated and pointed lamina; the index is strongly compressed.

This division also comprises but a single species, the *Cancer latipes*, Plancus,—De Conchis minus notis III, 7, B, C,—and which has also been figured by Leach—Malac. Brit., IV. There are three teeth front, and on each lateral edge five(1).

From the swimmers we pass to those whose feet all terminate in a point, or conical and sometimes compressed tarsus, but never forming a fin properly so called. Those of them whose shell is tapering, forming the arc of a circle before, and narrowed and truncated behind, in which the claws of both sexes are alike, where the number of the caudal segments is the same as in the Portuni, and which, with the exception of the tarsi, almost completely resemble them, will constitute our second section, that of the ARCUATA. In the

CANCER, Fabr.

Or the Crab properly so called, the third joint of the external foot-jaws is emarginated or marked with a sinus near the internal and almost square extremity. The antennæ scarcely extending beyond the front and composed of but few articulations, are flexed and glabrous, or but slightly hairy. The hands are rounded and have no appearance of a crest on the upper edge.

The radical joint of the external antennæ is, in some, much larger than the following ones, and resembles a lamina; terminated by a salient and advanced tooth, closing inferiorly the internal corner of the ocular cavities. The fossulæ of the middle or internal antennæ are nearly longitudinal. Such is the

C. pagurus, L.; *Crabe poupart*, &c.; Herbst., IX, 59. Shell reddish, wide, plane, almost smooth above, with nine festoons in each lateral margin, and three teeth in front. Its claws are large, smooth, with black fingers studded internally with blunt tubercles. It is sometimes a foot wide, and weighs five pounds. Common on the Atlantic coast of France, but less abundant in the Mediterranean. Its flesh is esteemed. Dr. Leach separates it generically from the other Crabs: Malac. Brit., XVII, x.

In the others, the lower joints of the Antennæ are cylindrical; although somewhat larger, the first does not differ from the following ones in form or proportion, and does not extend beyond the internal canthus of the ocular fossulæ; those of the intermediate antennæ are prolonged in a direction rather parallel to the breadth of the shell than to its length.

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(1) See the article *Platyonique*, Encyc. Methodique.

There are some of them—*C.* 11-*dentatus*, Fab., in which the extremity of the fingers are excavated like the bowl of a spoon: they form the *Clorodius*, Leach. Several species, where they terminate in a point, are remarkable for the arcuation of the edges of the shell which terminate posteriorly by a fold and overlapping projection, in the manner of an angle. Those with a tridentated front, and whose shell only presents that projection or posterior tooth, compose his genus *Carpilius*. The species of this subdivision,—*C. corallinus*, F.; *C. mauculatus*, Id., are marked with round blood-coloured spots. They more particularly inhabit the Indian Ocean. Many fossil Crabs appear to me to belong to this subdivision.

The *Xantho*, of the same, some of which, *Xanth. floridus*, Leach; Malac. Brit., XI;—*Cancer poressa*, Oliv., Zool. Adriat., II, 3, inhabit the coast of France, have their antennæ inserted in the internal canthus of the ocular fossulæ, and not in the outer one, as in those just mentioned.

Other considerations would authorise us to augment the number of these divisions, but our limits require us merely to indicate the principal ones.

The "*Crabe vulgaire de nos côtes*" of the first edition of this work, has in this one been placed among the Portuni.—*P. mænas.*

PIRIMELA, Leach.

These Crustacea completely resemble Crabs, but their external antennæ extend considerably beyond the front, and their stem, longer than their pedicle, consists of numerous joints. The fossulæ of the intermediaries, as in the *C. pagurus*, are rather longitudinal than transversal.

> But a single species is known, the *P. denticulata*, Leach, Malac. Brit., VIII; it is found in the British channel and in the Mediterranean. Perhaps we should refer to this species, the fossil described by Desmarest under the name of *Atélécycle rugueux*, in the Hist. Nat. de Crust. Foss., IX, 9.

ATELECYCLUS, Leach(1).

Fossulæ of the intermediate antennæ longitudinal; lateral antennæ elongated, salient and composed of many joints, but very hairy as well as the claws; the latter strong, and with compressed hands. The third joint of the foot-jaws sensibly narrowed above, resembling an obtuse or rounded tooth; conical tarsi, and the ocular pedicles of the ordinary size. The tail is longer than in the preceding Crustacea.

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(1) We had, at first, placed this subgenus, as well as the following one, among the Orbicularia.

Two species have been described(1). One from the coast of England, of a sub-orbicular form, and the other from that of France, Mediterranean as well as Oceanic. The

Thia, Leach,

Approaches Atelecyclus in the lateral antennæ, in the direction of the fossulæ in which the intermediaries are placed, in the form of the third joint of the external foot-jaws, and in the sub-orbicular shell; but the eyes, together with the pedicles, are extremely small and scarcely salient. The tarsi are strongly compressed and sub-elliptical. The front is arcuated, rounded, and without any marked dentations. The pectoral space between the feet is very narrow, and of the same breadth throughout. The claws are much weaker in proportion. The shell is smooth, and in some respects the Thiæ approach the *Leucosiæ* and the *Corystes*.

The type(2) of this subgenus, whose habitat was unknown, has been discovered by Milne Edwards in the sandy shores of the Mediterranean, near Naples. Risso—Journ. de Phys., 1822, p. 251,—described a second, dedicated to M. de Blainville, which he found in the river at Nice. The

Mursia, Leach(3),

Of which but a single species is known, and which is peculiar to that part of the Ocean which bounds the southern extremity of Africa, approaches the Matutæ and several Portuni, in the long spine with which each side of the shell is armed posteriorly; it also approximates to the true Crabs in the form of the shell and of the external foot-jaws, with this difference, that their third joint forms an elongated square, narrowed and obliquely truncated at its superior extremity; but, as in the Calappæ and Hepati, the hands are strongly compressed above, having a sharp and dentated edge, resembling a crest(4).

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(1) See Consid. Génér. sur la Classe des Crust., Desmar., p. 88, 89.

(2) Thia polita, Leach, Zool. Miscell. ciii.

(3) This name must be changed to avoid confounding the division with that of *Nursia*, another subgenus.

(4) Desmarest, *Consid. Gener.*, &c., IX, 3.

Hepatus, Latr.

The Hepati have a considerable affinity with the true Crabs in the widened form of their shell, and the shortness of their lateral antennæ, approaching the Mursiæ and Calappæ in their compressed hands, the upper edge of which resembles a crest; but the third joint of their external foot-jaws forms an elongated, narrow, and pointed triangle, without any apparent emargination, a character also observed in the Matutæ and Leucosiæ.

The species(1) which served as the type of this division was confounded by Fabricius with the Calapp. It is as large as an ordinary Pagarus. The shell is yellowish, dotted with red, and the margins finely and unequally crenulated. The eyes are small and approximated, and the feet are traversed by red bands. Although the tail of the male has but five complete segments, the traces of two others may still be discovered on the sides. This species is common at the Antilles.

In our third section or that of the Quadrilatera, the shell is nearly square or heart-shaped, the front generally prolonged, inflected or much inclined, and forming a sort of clypeus. There are seven segments, distinctly marked across their whole breadth, in the tail of both sexes. The antennæ are usually very short. The eyes of most of them are fixed on long or stout pedicles. Several live habitually on land, inhabiting holes excavated by themselves; others frequent fresh water streams. They move with great swiftness(2).

A first division will comprise those in which the fourth joint of the external foot-jaws is inserted at the superior internal extremity of the preceding one, either in a short, truncated projection, or in a sinus of the inner margin. They approach nearest to the Crabs proper.

The shell of some is nearly square, or a trapezium, but not transverse, or almost in the form of a truncated heart. The ocular pedicles are short, and inserted either near the lateral and anterior angles of the shell, or more internally, but always at a considerable distance from the middle of the front. Here comes the

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(1) *Hepatus fasciatus*, Latr.; Desmar., Considér., IX, 2;—*Calappa angustata*, Fabr.; *Cancer princeps*, Bosc.; Herbst., xxxvii, 2. See also his *Cancer armadillus*, VI, 42, 43.

(2) I consider them, with respect to their habits and some of the characters of their organization, as being the furthest removed from the other Decapoda; they should be placed at one of the extremities of that order.

ERIPHIA, Lat.

Where the lateral antennæ are inserted between the ocular cavities and the median antennæ; the nearly cordiform shell is truncated posteriorly, and the eyes are removed from its anterior angles.

The coast of France furnishes a species—*Cancer spinifrons*, Fab.; Herbst., XI, 65; Desmar., Consider., XIV, 1, which is the *Pagurus* of Aldrovandus. The sides of its shell are furnished with five teeth, the second and third bifid. The front and claws are spiny; the fingers black.

TRAPEZIA, Lat.

The Trapeziæ resemble the Eriphiæ in the insertion of their lateral antennæ, but their shell is nearly square, depressed, and smooth; the eyes are placed at its anterior angles, and the claws, in comparison with the other feet, very large.

All the species are exotic(1), and inhabit Eastern Seas. The

PILUMNUS, Leach,

Differs from the two preceding subgenera, in the insertion of the lateral antennæ at the internal extremity of the ocular cavities, above the origin of the pedicles of the eyes. The Pilumni, as to the form of the shell, approach nearer to the Crustacea of the second section, than the other Quadrilatera, and in this respect stand somewhat ambiguously between the two. As in most of the Arcuata the third joint of their foot-jaw is nearly square or pentagonal. The lateral antennæ are longer than the ocular pedicles, and have a setaceous stem longer than the peduncle and composed of numerous small joints. The tarsi are simply pilose(2).

THELPHUSA, Lat.(3)

The lateral antennæ situated as in the Pilumni, but shorter than the ocular pedicles, composed of but few joints, and with a cylindrico-conical stem hardly longer than its peduncle. The shell is almost shaped like a truncated heart, and the tarsi are furnished with spinous or dentated ridges.

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(1) *Cancer cymodoce*, Herbst., li, 5;—*C. rufo-punctatus*, Id., xlvii, 6;—*C. glaberrimus*, Id., xx, 115. See the article *Trapézie*, Encyc. Methodique.

(2) See the article *Pilumne*, Encyc. Method., and Desmarest, op. cit. p. 111.

(3) The *Potamophiles* of the first edition of this work. That name having been already applied to a genus of Coleopterous Insects, I have substituted the present one.—See this word in the second edition of the Nouv. Dict. d'Hist. Nat. They are the *Potamobiæ*, Leach, *Potamon*, Savigny.

Several species are known, all of which inhabit fresh water, but capable, as it would appear, of living at a distance from it for a considerable time. One of them, mentioned by the ancients, is found in the south of Europe, the Levant, and in Egypt; it is the *Crabe fluviatile*, of Belon, Rondelet, and Gesner(1). It is very common in several brooks and various lakes of the craters of the south of Italy; its effigy is observable on different antique Grecian medals, particularly on those of Sicily. The shell is about two inches in each diameter. It is greyish or yellowish, as the animal is living or dead, mostly smooth, with little incised rugæ and asperities on the anterior sides. The front is transversal, inclined, reflected, and edentated. The claws are rough, with a reddish spot at the extremity of the fingers, which are long, conical, and unequally dentated. The Greek monks eat it raw, and during lent it forms one of the articles of diet used by the Italians.

Two naturalists, travellers of the government, prematurely taken from the sciences, Delande and Leschenault-de-Latour, discovered two other species; one was collected by the first in his travels to the south of Africa, and the other by the second in the mountains of Ceylon.

The *Cancer senex* of Fabricius (Herbst., XL, 5), should, in my opinion, be referred to the same subgenus. It inhabits the East Indies.

A species peculiar to America, the *Thelphusa serrata*, Herbst., X, ii, is proportionably wider and flatter than the others, presenting certain characters which seem to indicate a particular division(2).

Other Quadrilatera having, like the preceding ones, the fourth joint of the external foot-jaws inserted in the internal extremity of the previous joint, differ from them in the trapezoidal, transverse and widened form of the fore-part of the shell, as well as in their ocular pedicles, which, like those of the Podophthalmi, are long and slender, extending to the anterior angles, and inserted near the middle of the front. The claws of the males are long and cylindrical: such is the

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(1) See Olivier Voy., en Egypte, pl. xxx, 2; and the plates of Nat. Hist., in the great work on that country.

(2) See also the subgenus OCYPODE. I have made a new one called TRICHODACTYLUS, with a fresh-water species from Brazil analogous to the preceding ones, but with an almost square shell, the third joint of the external foot-jaws forming an elongated triangle hooked at the end, and the tarsi covered with a close down.

The *Graspus tesselatus*, of the pl. (cccv, 2) of Nat. Hist., Encyc. Method., is also the type of the new genus MELIA, but one of too little importance to be treated of in detail in a work like this.

Gonoplax, Leach.

Two species of which are found in European seas; one of them, however, may possibly be a mere variety of the other.

The first—*Cancer angulatus*, L.; Herbst., I, 13; Leach, Malac. Brit., XIII, has the anterior angles of its shell prolonged into a point, and a second, but smaller spine behind. Two others are observed on the claws of the males, one on the joint called the *arm*, and the other on the internal side of the carpus; the hands are elongated, and somewhat narrowed at base; another tooth is found on the superior extremity of the thighs of the other feet. The body is reddish. It inhabits the western coast of France, and that of England.

In the second—*Cancer rhomboides*, L., the shell presents no other spines than those formed by the prolongation of the anterior angles. The body is smaller, and of a reddish-white or flesh colour. From the rocky localities of the Mediterranean(1).

In the second division of the Quadrilatera, the fourth joint of the external foot jaws, or those which cover the other parts of the mouth below, is inserted in the middle of the extremity of the preceding joint, or more outwardly.

Sometimes the shell is trapezoidal or ovoid, or is shaped like a heart truncated posteriorly. The ocular pedicles, inserted at a short distance from the middle of its anterior margin, extend to its anterior angles, or even beyond them.

Commencing with those whose shell is transversely quadrilateral, widened before and narrowed behind, or which has the form of an egg, we first observe the

Macrophthalmus, Lat.

Where the shell, as in the Gonoplaces, is trapezoidal and the claws are long and narrow; the ocular pedicles are slender, elongated, and lodged in a groove under the anterior margin of the shell. The first joint of the intermediate antennæ is rather transverse than longitudinal, and the two which terminate them are very distinct and of a mean size. The external foot-jaws are approximated inferiorly at their inner edge, leaving no interval between them, and their third joint is transverse.

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(1) See the article *Rhombille*, Encyc. Methodique.

They(1) inhabit the Eastern Ocean and the seas of New Holland.

The following, which constitute the subgenera *Gelasimus*, *Ocypode*, and *Mictyris*, inhabit burrows, are remarkable for the celerity of their course, and have the fourth pair of feet, and next to them, the third, longer than the others. The intermediate antennæ are excessively small and hardly bifid at the extremity; the radical joint is nearly longitudinal. They are peculiar to hot climates.

Here the shell is solid, of a quadrilateral or trapezoidal form, widest before.

GELASIMUS, Lat.—*Uca*, Leach.

Eyes terminating their pedicles like a small head; third joint of the external foot-jaws forming a transverse square; last segment of the tail of the males almost semi-circular, that of the females nearly orbicular.

The lateral antennæ are longer and slenderer in proportion than those of the Ocypodes. One of the claws, now the right, and then the left, varying in individuals of the same species, is much larger than the other; the fingers of the small one are frequently shaped like a spoon or spatula. The animal closes the entrance of its burrow, which it excavates in the vicinity of the sea-shore, or in marshy places, with its large claw. These burrows are cylindrical, oblique, very deep, and placed close to each other, but are usually inhabited by a single individual. Their habit of holding the large claw in an upright position before the body, as if making an appellative gesture, has obtained for them the name of *Calling-Crabs*—*Cancer vocans*. One species, observed by Bosc in South Carolina, passes the three winter months in its retreat without leaving it, and only visits the sea when about to spawn(2).

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(1) *Gonoplax transversus*, Latr., Encyc. Method., Hist. Nat., ccxcvii, 2;—*Cancer brevis*, Herbst., lx, 4. The *Gonoplace de Latreille*, a fossil species described by Desmarest, Hist. Nat. des Crust. Foss., IX, 1—4, and perhaps also his *G. incisé*, IX, 5, 6, may be a Macrophthalmus; generally speaking, however, his fossil Gonoplaces are Gelasimi. The species he calls *Gélasime luisante*, VIII, 7, 8, does not appear to differ from the living one which I have called the *maracoani*, Encyc. Method., Ib., ccxcvi, 1.

(2) See the article *Gélasime*, Nouv. Dict. d'Hist. Nat., Ed. II, and the same article in the work of Desmarest on animals of that class. The Crabs, *cietie-ete*, *cietie-panama*, of Marcgrave, appear to me synonymous with the *Gelasimus pugilator*. According to the observations of M. Marion, communicated to the Acad.

OCYPODE, Fabr.

Eyes extending into the greater part of the length of their pedicles, or claviform; third joint of the external foot-jaws forming a long square; tail of the males very narrow, and the last joint an elongated triangle; that of the females is oval.

The claws are nearly similar, strong, but short, and the forceps shaped like a reversed heart. Agreeably to the indication afforded by their generic name, these Crustacea run with great swiftness, which indeed is such, that a horse can scarcely overtake them, whence the name of *Eques*, given to them by the older naturalists. They are now sometimes termed *Land-Crabs*, and occasionally, naturalists have confounded them with the Gecarcini, under the general denomination of *Tourlouroux*. The Ocypodes, during the day, remain in the holes or burrows they have excavated in the sand, near the sea-shore, and quit them after sun-set.

> *Ocyph. eques; Cancer cursor*, L.; *Cancer eques*, Bel.; *Ocyph. ippeus*, Oliv., Voy. dans l'Emp. Ottom., II, xxx, 1. Distinguished from all the others by the bundle of hairs, which terminate the ocular pedicles. It inhabits the coast of Syria, that of Africa bordering on the Mediterranean, and is even found at Cape de Verd. In the
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> *Ocyp. cerathophthalmus; Cancer cerathopt.*, Pall., Spic. Zool., fasc. IX, v, 2—8, the superior extremity of these pedicles extends beyond the eyes for more than a third of their whole length, in a conical and simple point. The forceps are codiform, very rough, and their cutting edge dentated. From the East Indies.

In others the pedicles are terminated by the eyes forming a sort of club. Some from the eastern continent and all those of the western world are thus formed, but the latter possess a peculiar character, which indicates more aquatic habits, or that they swim with more facility: their feet are smoother, flatter, and furnished with a fringe of hairs. Such is the *O. blanc*, Bosc. Hist. Nat. des Crust., I, 1. The *Cumuru* of Marcgrave belongs to this division(1).

In classing the collection of the Museum d'Histoire Naturelle, we

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Roy. des Sc., by M. de Blainville, this inequality of the forceps is peculiar to the males, at least such was the case in all the numerous specimens examined by him in his voyage to the East Indies.

(1) For the Ocypodes of the western continent, see the observations of M. Say, Journ. Ac. Nat. Sc. Philad. His *Ocyp. reticulatus* is a Grapsus. Consult, also, the article *Ocypode*, Nouv. Dict. d'Hist. Nat., and the work of M. Desmarest.

placed among the Ocypodes, under the specific name of *quadridentata*, a crustaceous animal, which appears to us to bear a close resemblance to the *Gécarcin trois-épines*, Desmar., a fossil species, Hist. Nat. des. Crust. Foss., VIII, 10; he suspects it may belong to the genus Thelphusa.

Here, at least in the females, the shell is very thin, membranous, and flexible, and the body almost round or subovoid. The ocular pedicles are sensibly shorter than in the preceding subgenera. First comes the

MICTYRIS, Lat.

Where the body is subovoid, highly inflated, narrower and more obtuse before, and truncated posteriorly; the clypeus considerably diminished, and its extremity narrowed into a point. The claws form an elbow at the junction of the third and fourth joint, the latter of which is almost as large as the hand; the other feet are long, with angular tarsi. To these essential characters we will add, that the ocular pedicles are curved and crowned with globular eyes; that the external foot-jaws are very ample, and their internal edge hairy, the second joint being very large, and the following one almost semicircular.

Two species are known: one is found in the Australasian Ocean(1), and the other in Egypt(2), where it was observed by M. Savigny. Immediately after these come the

PINNOTHERES, Lat.

Very small crustacea, which during a part of the year, in November particularly, inhabit various bivalve shells, chiefly the Mytili and Pinnæ. The shell of the females is sub-orbicular, very thin and soft, while that of the males is solid, almost globular and somewhat narrowed into a point before. The feet are of a middling length and the claws straight and formed as usual. The external foot-jaws present but three distinct joints, the first large, transversal, and arcuated, and the second furnished at its internal base with a small appendage. The tail of the female is very ample and covers the whole under part of the body.

The ancients believed that they resided with the Mollusca, in whose shells they are found, on friendly terms, warning them of danger and seeking food for them. The inhabitants of certain districts, at the present day, attribute to their presence the unwholesome qualities sometimes manifested in the Mytili(1).

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(1) Lat., Gener. Crust. et Insect., I, 40; Encyc., Method., Atlas d'Hist. Nat. ccxcvii, 3; Desmar., Consider., XI, 2. This subgenus, and that of *Pinnotheres*, in the first edition of this work, constituted part of the Orbicularia; but in their natural order they approach the Ocypodes, Gecarcini, &c.

(2) Pl. d'Hist. Nat., of the great work on Egypt.

We now arrive at Crustacea, which, although analogous to those just mentioned in the insertion of their ocular pedicles, are removed from them in respect to their shell. It is heart-shaped and truncated posteriorly, elevated, dilated and rounded on the sides near the anterior angles. The ocular pedicles are shorter than those of the preceding subgenera, and do not quite extend to the lateral extremities of the shell. The intermediate antennæ are always terminated by two very distinct divisions. The inhabitants of the French colonies designate them by various appellations, such as, *Tourlouroux*, *Crabes-peints*, *Crabes de terre*, and *Crabes violets*, which may apply to different species, or to varieties from age; no observations worthy of credence have as yet settled this point of nomenclature. These animals more particularly inhabit intertropical countries and those which adjoin them. Their habits are a constant source of interest to travellers, but by abstracting from their accounts all improbable and doubtful facts, their history will be as follows. The greater portion of their life is passed on land, where they secrete themselves in holes, from which they never issue but at night. Some inhabit cemeteries. Once in the year, about the spawning season, they collect in immense bands and pursue a direct course to the sea, heedless of all obstacles; after depositing their ova, they return much enfeebled. It is said that they seal up the mouth of their burrow during the time they are casting their shell. When this is effected, and while yet soft, they are called *Boursiers*, and their flesh is much esteemed, although sometimes poisonous. This quality is attributed to the fruit of the manchineel, which they are supposed, falsely perhaps, to have eaten. In some of them, such as the

Uca, Lat.,

The size of the feet, commencing with those of the second pair, progressively diminishes; they are extremely pilose, and the tarsi simply sulcated without any remarkable spines or dentations.

The only species known—*Cancer uca*, L., Herbst., VI, 38, inhabits the marshes of Guiana and of Brazil.

In others, the third and fourth pair of feet are longer than the second and fifth; the tarsi are marked with dentated or very spinous ridges. They form two subgenera.

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(1) For species see Leach, Malac. Podoph. Britt., and Desmar., Considér. Génér. sur les Crust., 116.

CARDISOMA, Lat.

The four antennæ and all the joints of the external foot-jaws exposed; the three first joints of these same foot-jaws straight; the third shorter than the second, emarginated superiorly and nearly cordiform; the first of the lateral antennæ almost similar and broad.

They are called *Crabes blancs* at the Antilles, though sometimes they have a yellow shell striped with red(1).

GECARCINUS, Leach.

The four antennæ covered by the clypeus; second and third joints of the external foot-jaws, large, flattened, arcuated, and leaving a space between their inner sides, the last one forming a curvilinear triangle, obtuse at the summit; it reaches to the clypeus, and covers the three following ones, or the fourth, fifth, and sixth.

> The most common species—*Cancer ruricola*, L., Herbst., III, 36, when young, IV, xx, 116; xlix, 1, is of a more or less lively blood-red colour, more or less extended, and sometimes spotted with yellow with a deeply marked impression of the letter H. It is the *Crabe violet*, and *Crabe peint* of travellers; the name of *Tourlourou* appears to me to be more peculiarly applied to this species(2).

Sometimes the shell is nearly square, subisometrical or not, broader than it is long, flattened, and the front turned down for nearly the whole of its width. The ocular pedicles are short and inserted at the anterior lateral angles. The two ordinary divisions of the intermediate antennæ are very distinct. The inner sides of the exterior foot-jaws are separated, leaving an angular space between them; their third joint is almost as long as it is broad. The claws are short and thick, and the other feet very flat; the fourth pair, and then the third are longer than the others; tarsi spinous.

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(1) *Cancer cordatus*, L.;—*Cancer carnifex*, Herbst., XLI, 1, IV, 37;—*C. guanhumi*, Marcgrave. The tarsi have four ridges; there are two additional ones in the Gecarcini.

(2) See the article *Tourlourou* in the Encyc. Methodique. Messrs Audouin and Edwards have lately communicated to the Acad. Roy. des Sc., some very curious remarks upon an organ peculiar to these animals, which forms a sort of reservoir capable of containing a certain quantity of water, and placed immediately above the branchiæ. This accounts for the unusual convexity of the anterior sides of their thorax.

PLAGUSIA, Lat.

The mediate antennæ lodged in two longitudinal and oblique fissures traversing the whole thickness of the middle of the clypeus(1). They are inferior or covered by this part in

GRAPSUS, Lam.

Where the shell is somewhat wider before than behind, or at least not narrower, while in the Plagusiæ it widens from before backwards.

The Grapsi are found throughout all parts of the globe, but are more particularly abundant in the vicinity of the tropics. They are not seen in Europe beyond 50° of latitude. If I mistake not they are called *Cériques* at Martinique. Marcgrave has figured some Brazilian species by the names of *Aratu*, *Aratu-pinima* (*Grapsus cruentatus*, Lat.) and *Carava-una.* At Cayenne they are called *Bagabeumba*, or soldier.

These animals conceal themselves during the day under stones, &c., at the bottom of the sea. I have been informed that some of them even climb up the trees on its shores and hide beneath their bark. The broad and flattened form of their body and feet enables them to support themselves for a moment on the surface of the water; they always walk sideways, sometimes to the right and at others to the left. Certain species inhabit rivers within the bounds of tide water, but most frequently live on their banks or on land. They assemble in great numbers, and when any one appears among them, they hurry to the water with a tremendous noise, caused by striking one claw against the other. Their habits are similar to those of other carnivorous Crustacea(2).

G. varius, Lat.; *Cancer marmoratus*, Fab.; Oliv., Zool., Adr., II, 1; *Cancre madre*, Rondel.; Herbst., XX, 114. Size middling; nearly square, hardly broader than long; yellowish or livid; greatly elongated above, and marked with numerous fine lines and points of a reddish-brown; four flattened projections arranged transversely at the base of the clypeus, and three teeth at the anterior extremity of each lateral edge. The tarsi are spiny. The

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(1) *P. depressa*, Lat.; Herbst., III, 35;—*P. clavimana*, Lat., Herbst., lix, 3; Desmar., Considér., XIV, 2. The tail appears to me to consist of but four distinct segments. The third, however, presents one or two deep and transverse lines. In the Grapsi there are seven segments, the third of which has an angular dilatation on each side of its base.

(2) See Bosc, Hist. Nat. des Crust.

G. porte-pinceau; Cuv. Règne Anim., IV, xii, 1; Rumph., Mus. X, 2; Desmar., Consider., XV, 1, is remarkable for the numerous, long and blackish hairs with which the superior surfaces of the fingers are furnished. The tarsi are without spines, a character exclusively peculiar to this species. It is found in the East Indies(1).

In our fourth section or the ORBICULATA(2), the shell is either sub-globular, rhomboidal or ovoid, and always very solid; the ocular pedicles are always short or but slightly elongated; the claws of unequal size according to the sex, those of the males being largest; there are never seven complete segments in the tail; the buccal cavity grows gradually narrower towards its superior extremity, and the third joint of the external foot-jaws always forms an elongated triangle. The posterior feet resemble the preceding ones, and neither of the latter is ever very long. In the

CORYSTES, Latr.,

The shell is an ovoidal oblong, and crustaceous; the lateral antennæ are long, projecting and ciliated; ocular pedicles of a mean size and separated; third joint of the external foot-jaws longer than the preceding one, with a visible emargination for the insertion of the next. The tail is composed of seven segments, the two middle ones obliterated in the males.

A species—*Cancer personatus*, Herbst., XII, 71, 72; Leach, Malac. Brit., VI, 1, is known on the coast of France. The lateral edge of its shell is marked with three notches on each side.

A second was brought from the Cape of Good Hope by the late Delalande.

LEUCOSIA, Fab.

Form of the shell varying, but generally ovoid or almost globular, and always very hard and stony; lateral antennæ and eyes very small; eyes approximated. The third joint of the external foot-jaws is smaller than the second, and without any apparent internal sinus;

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(1) See the article *Plagusie*, Encyc. Method., and the Histoire des Animaux sans vertèbres of Delamarck, genus *Grapse*.

(2) The Orythiæ and the Dorippes, in a natural series, would, in my opinion, belong to this section, and lead to the Corystes; their shell is a truncated ovoid.

these parts are contiguous inferiorly along the internal edge, and form an elongated triangle, the extremity of which is received into two upper cells of the buccal cavity. The tail, which is ample and suborbicular in the females, usually consists of from four to five segments, but never seven.

Doctor Leach(1) has separated this genus of Fabricius into several genera, which, however, we will consider as simple divisions.

Those species which have a transversal shell, with the middle of its sides greatly prolonged or dilated, so as to resemble a cone or cylinder, form his genus *Ixa*(2).

Those which have a rhomboidal shell with seven conical points, resembling spines on each side, compose that of *Iphis*.

If the shell still has the same rhomboidal figure, but merely presents angles or sinuses on the sides, it becomes his genus *Nursia*.

If these lateral edges are smooth, we have his *Ebalia*.

The Leucosiæ with an ovoid or nearly globular shell, and otherwise distinguished from several of the preceding by the claws being always longer than the body and thicker than the other feet, and by the tarsi being sensibly striate, may be divided thus:

In some the front projects, or at least is not surpassed by the superior extremity of the buccal cavity. The outer branch of the external foot-jaws is elongated, and almost linear.

Here the claws are slender, the hands cylindrical, and the fingers long.

Sometimes the shell is nearly globular, and either very spiny, as in the genus *Arcania*, or smooth as in Ilia.

At others, the shell is suborbicular and depressed, as in the genus *Persephona*, or ovoid as in *Myra*.

There the claws are thick, with ovoid hands and short fingers.

They constitute the true *Leucosiæ* of that naturalist.

In the others, the superior extremity of the buccal cavity outreaches the front. The outer branch of the external foot-jaws is short, and arcuated; the shell rounded and depressed. This last division comprises his genus *Phylira*.

Other considerations, founded on the proportions of the feet and the form of the external foot-jaws, strengthen these characters.

The *Leucosie noyau*; *Ilia nucleus*, Leach; *Cancer nucleus*, Lin., Herbst., XI, 14, is common in the Mediterranean; its shell is globular, granulated on the sides and posteriorly; the front is notched; two teeth on the posterior margin, and two others widely separated on each lateral margin; the posterior largest and spiniform, and situated above the origin of the posterior feet.

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(1) Leach Zool. Misc. III; Desmar., Consid.

(2) *Leucosia cylindrus*, Fabr., Herbst., II, 29—31.

The sea coast of the western departments of France produces some other species which belong to the genus *Ebalia*, Leach(1). All the remaining ones are from India and America.

Some fossil Leucosiæ are found in the East Indies. Three species have been described by M. Desmarest, two of which, according to him, are true Leucosiæ, Leach, and which are now living in the same countries, and peculiar to them.

Our fifth section, that of the TRIGONA, is composed of those species whose shell is usually triangular or subovoid, narrowed before into a point or kind of beak, generally uneven and rough, with lateral eyes. The interval comprised between the antennæ and the buccal cavity, is always nearly square, as long, or almost as long as broad. The claws, at least those of the males, are always large and elongated. The following feet are very long in a great number, and sometimes the two last even differ in form from the preceding ones. The third joint of the external foot-jaws is always nearly square or hexagonal, in those at least whose feet are of the ordinary length.

The apparent number of the caudal segments varies. In both sexes of several it is seven; in others, however, the males at least, it is less.

Several of these Crustacea are designated by the vulgar appellation of *Araignées de mer* or *Sea-spiders.*

Although the species of this tribe are very numerous, but two have as yet been discovered except in a fossil state, one of which at least—*Maia squinado*—exists at the present day in a living state, and in the same localities(2).

A first division will comprehend those whose second and following feet are similar, and which diminish progressively in size.

From the latter we will form a first group of all those where the tail, either in both sexes, or in the females alone, is composed of seven segments. The third joint of the external foot-jaws is almost always square, and truncated or notched at the superior internal angle.

Very large claws, particularly so when compared with the other feet, which are extremely short, directed horizontally and perpendicularly to the axis of the body as far as the carpus or joint immediately preceding the hand, then reflected anteriorly on themselves with the fingers bent, suddenly forming an angle; very short ocular pedicles, projecting but little, if at all, from their cavities; a stony and very uneven or spiny shell, designate the

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(1) Malac. Brit., xxv.

(2) See Desmar., Hist. Nat. des Crust. Foss

Parthenope, Fab.

The lateral antennæ of some are very short, not exceeding the length of the eyes; the first joint is entirely situated under the ocular cavities.

If there are seven segments in the tail of both sexes, we have the genus *Parthenope* properly so called(1) of Leach.

If that of the males presents but five, it is his genus *Lambrus*(2).

The lateral antennæ of the others are sensibly longer than the eyes; their first joint extends to the superior internal extremity of the cavities peculiar to these latter organs, and appears to be confounded with the shell. The post-abdomen is always composed of seven segments. The claws of the females are much shorter than those of the opposite sex. The same naturalist distinguishes these Crustacea generically by the name of *Eurynoma.* But a single species is known which inhabits the English and French coasts(3).

All the other Parthenopes, one excepted(4) are from the Indian Ocean.

In the following ones, the claws always project, and their length, at most, is double that of the body; their fingers are not suddenly bent into an angle(5).

Here the length of the longest feet—the second—barely exceeds that of the shell from the eyes to the origin of the tail. The under part of the tarsi is usually either dentated or spiny, or furnished with a ciliated fringe terminated like a club.

We will commence with those whose ocular pedicles are very short, or of a mean length, susceptible of being entirely retracted within their cavities, and whose claws, at least in the males, are considerably thicker than the other feet.

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(1) *Parthen. horrida,* Fab.; Rumph., Mus., IX, 1; Seba, III, xix, 16, 17; Herbst., XIV, 88.

(2) *Panth. longimana,* Fab.; Rumph., Mus., VIII?—*P. giraffa,* Fab.; Herbst., XIX, 108, 209;—*P. lar,* Fab.;—*P. rubus,* Latr.;—*Cancer contrarius,* Herbst., lx, 3;—*P. macrocheles,* Lat., Herbst., XIX, 107;—*Cancer longimanus,* L., fem., *P. trigonomana,* Lat.; *Cancer prensor,* Herbst., xli, 3.

(3) *Cancer asper,* Penn., Brit. Zool., IV; *Eurynoma aspera,* Leach, Malac. Brit., XVII.

(4) *Parthenope angulifrons,* Latr., Encyc. Method.; *Cancer longimanus,* Olivi.

(5) The first joint of the lateral antennæ appearing to form part of the shell, has been mistaken by several naturalists, the second having been considered by them as the first.

MITHRAX, Leach.

Robust claws; ends of the fingers like the bowl of a spoon; stem of the lateral antennæ sensibly shorter than the pedicle; the tail composed of seven segments in both sexes.

All the known species are from the American seas(1).

ACANTHONYX, Latr.

A tooth or spiniform projection on the inferior side of the tibæ; under part of the tarsi pilose, and as if pectinated; superior surface of the shell smooth. The tale of the males presents, at most, but six complete segments(2).

PISA, Leach.

Claws of a mean size, with pointed fingers; tibæ without any spine beneath, and the tail composed of seven segments in both sexes. As in the preceding subgenera, the lateral antennæ are inserted at an equal distance from the fossulæ that receive the intermediate ones, and from the ocular cavities, or rather nearer to the latter.

These, as in the genus *Naxia*, Leach, (3) have two ranges of dentations on the under part of the tarsi. Those have but a single row of dentations, or a simple fringe of thick claviform cilia, under the same joint. The latter constitute the genus *Lissa* of that author(4).

Among those which have a range of dentations, the feet sometimes gradually diminish in length, as happens in his *Pisa*(5) properly so called, and at others, the third ones, in the males, become abruptly shorter than those which precede them, as in his *Chorinus*(6).

PERICERA, Latr.

The Periceræ, though approaching the Pisæ in the form and pro-

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(1) *Mithrax spinicinctus*, Latr.; Desmar., Consid., p. 150;—*Cancer hispidus*, Herbst., XVIII, 100;—*Cancer aculeatus*, Herbst., XIX, 104;—*C. spinipes*, ejusd., XVII, 94. The *Iachus hircus*, Fab., is perhaps a congener.

(2) *Maia glabra*, Collect. du Mus. d'Hist. Nat.; *Maia lunulata*, Risso, I, 4; *Libinia lunulata*, Desmar.

(3) *Pisa aurita*, Latr., Encyc. Method.—*P. monoceros*, Ib.

(4) *Pisa chiragra*, Latr., Encyc. Method.; Desmar., Consid.

(5) *Pisa xyphias*, Latr., Ib.;—ejusd., Ib. *P. aries;—P. barbicornis;—P. cornigera;—P. styx;—P. bicornuta;—P. trispinosa;—P. armata*, Leach, Malac. Brit., XVII; *Cancer muscosus ?*, Lin.;—*P. tetraodon*, Leach, Ib. xx.

(6) *Pisa heros*, Latr., Encyc. Method.

portions of the claws, and the number of their caudal segments, are removed from them, as well as from the other anterior subgenera, by the insertion of their lateral antennæ under the snout, and their approximation to the fossulæ lodging the intermediate ones, being closer than to those which receive the ocular pedicles(1).

In the two following subgenera the ocular pedicles are short or moderate, as well as in the preceding ones. But the claws, even those of the males, are hardly thicker than the following feet. The tail always consists of seven segments. In the

MAIA, Leach,

The second joint of the lateral antennæ seems to arise from the internal canthus of the ocular fossæ. The hand and the joint which precedes it are nearly of the same length. The shell is ovoid.

This subgenus established by Lamarck, and originally consisting of a great number of species, comprises, at present, according to the method of Dr Leach, but one, the *Cancer squinado*, Herbst, XIV, 884, 5, lvi; *Inachus cornutus*, Fab. It is very common on the coast of France and in the Mediterranean, where it is called *Araignée de mer*. It is one of the largest of the European Crustacea, and the *Maia* of the ancient Greeks, figured on some of their coins. They attributed great wisdom to it, and considered it as sensible to the charms of music.

MICIPPE, Leach.

The first joint of the lateral antennæ curved, dilated at its superior extremity into a transverse and oblique blade, closing the ocular fossæ; the ensuing joint inserted under its superior margin. The shell, viewed from above, appears widely truncated before; its anterior extremity is inclined, and terminates in a sort of clypeus or dentated rostrum(2). The

STENOCIONOPS, Leach,

Is distinguished from all the other subgenera of this tribe by long and slender ocular pedicles which protrude from their fossulæ(1).

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(1) *Maia taurus*, Lam.; *Cancer cornudo*, Herbst., lix, 6.

N.B. The genus *Amathia* of M. P. Roux, Hist. des Crust. de la Mediterr., &c., liv. I, does not differ from my Pericera—it even appears to me to have the same type. The Lithographic plates which accompany this work are distinctly and faithfully executed.

(2) *Cancer cristatus*, L.; Rumph., Mus., VIII, 1, the male.—*Cancer phylira*, Herbst., lviii, 4; Desmar. Considér., XX, 2.

There, the under surface of the feet presents neither ranges of dentations nor claviform cilia. Those of the first pairs, at least, are one half longer than the shell, and frequently much longer. The body is usually more abbreviated than in the preceding subgenera, being either nearly globular, or formed like a shortened egg.

A species of this tribe,—*Maia retuja*, Coll. du Jard. du Roi, whose shell is woolly and forms a truncated ovoid, or is obtuse anteriorly; whose strongly curved elongated ocular pedicles are received into fossulæ situated under the lateral margin of the shell; whose carpus is elongated, as in Maia, presents another character which exclusively distinguishes it, viz. the length of the feet seems to augment progressively from the second pair onwards, or at least to differ but little. It is the type of the genus

CAMPOSCIA, Leach.

In the others, as usual, the length of the feet progressively diminishes from the second pair to the last.

In some of them, the ocular pedicles, although much shorter than in the Stenocionops, are always salient, and the third joint of the pedicle of their lateral antennæ is as long, or even larger, than the preceding one, the antennæ themselves terminating in a long setaceous stem. They approach the Micippes; such is the

HALIMUS, Latr.(2)

In those which constitute the two following sub-genera, the ocular pedicles are susceptible of being entirely retracted within their fossulæ, and are protected posteriorly by a dentiform projection, or angle, of the lateral edges of the shell. The second joint of the peduncle of the lateral antennæ is much larger than the following one; they are terminated by a very short stem resembling an elongated stylet.

HYAS, Leach.

Lateral edges of the shell dilated behind the ocular cavities which are large and oval; external side of the second joint of the lateral antennæ compressed and carinated; ocular pedicles, when erected, entirely exposed. The body is sub-ovoid(1). In the

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(1) *Cancer cervicornis*, Herbst., lviii, 2, from the Isle of France. M. Desmarest was mistaken in citing, as the type, Consid. Gen. sur les Crust., p. 153, the *Maia taurus*, Lamarck.

(2) Two species, one of which appears to be allied to the *Cancer superciliosus*, L., Herbst, XIV, 89.

LIBINIA, Leach,

The ocular fossulæ are very small and nearly orbicular, and the ocular pedicles are very short, and but very slightly exertile. The second joint of the lateral antennæ is cylindrical, and not compressed, or but very slightly so? The body is nearly globular, or triangular.

We will unite the *Doclæa* and the *Egeria* of Leach, to his LIBINIÆ.

In his Libiniæ, properly so called(2), the claws of the males are thicker than the two following feet and almost as long. The length of the longest does not exceed twice that of the shell.

The claws of the male Doclæa(3) are much shorter than the two following feet. The length of the latter is hardly more than once and a half that of the shell, which is nearly globular and always covered with a brown or blackish down.

In the Egeriæ(4) the claws are filiform and the hands much elongated and almost linear. The following feet are five or six times longer than the shell. The body is triangular.

Having reviewed all the sub-genera of this tribe in which the feet subsequent to the claws are of a similar form, and in which the tail, of the females at least, and most generally in both sexes, is composed of seven complete joints or segments, we now pass to those in which it never consists of more than six. The feet are usually long and filiform, as in the last sub-genera. With the exception of the Leptopi, these Crustacea are also removed from the preceding by the form of the third joint of the external foot-jaws. It is proportionally narrower, and contracted at base, and the ensuing joint appears to be inserted in the middle of its superior margin, or more externally. The following sub-genus differs from those which succeed to it, in the tail of the males, where we only find three segments. The form of the third joint of the external foot-jaws appears to me the same as in the preceding sub-genera.

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(1) *Cancer araneus*, L.; Leach, Malac. Brit., XXI, A; Herbst., XVII, 59;—*Hyas coarctata*, Leach, Ib., xxi, B.

(2) *Libinia canaliculata*, Say, Journ. Acad. Nat. Sc. Philad. vol. I, p. 77, iv, 1;—*L. emarginata*, Leach, Zool. Misc., cviii.

(3) *Doclæa Rissonnii*, Leach, Zool. Misc., lxxiv. The *Inachus ovis* and the *I. hybridus*, Fab., should be referred to it.

(4) *Egeria indica*, Leach, Zool. Misc., lxiii; *Inachus spinifer*, Fab.

Leptopus, Lam.

Tail of the females composed of but five segments; the body convex and feet very long.

But a single species is known which is part of the collection of the Muséum d'Histoire Naturelle, where it is called *Muia longipes.* Doctor Leach proposed to designate this genus by the name of Stenopus, a denomination we have not adopted, inasmuch as it is already appropriated to another. That of Leptopus, Lam., is composed of several species, which, the above mentioned one excepted, according to the characters here given, must be excluded from it.

If we except some species of Hymenosomæ in which the tail presents but four, or at most five, distinct segments, that part of the body consists of six in all the following sub-genera, either in both sexes, or in the males. The third joint of the external foot-jaws is sometimes in the form of an inverted triangle or of a posteriorly narrowed oval, and sometimes in that of a heart. The ensuing joint is inserted in the middle of its superior margin, or rather more outwards than inwards.

Some of them, such as the three following sub-genera, approach those of which we have just spoken by the almost isometrical, or at least transversal form of the epistoma. The base of the intermediate antennæ is but a short distance from the superior margin of the buccal cavity.

One of these sub-genera is distinguished from the others by the flatness of the shell, and by the superior extremity of the first joint (free in several) of the lateral antennæ, which does not extend beyond that of the ocular pedicles. Such is the

Hymenosoma, Leach.

The shell is triangular or orbicular(1). The species are generally small and peculiar to the Indian Ocean and coast of Australia. The number of caudal segments varies, but never extends beyond six.

In the two following sub-genera, the shell is more or less convex, always triangular and terminated before in a rostrum. The first joint of the lateral antennæ, always fixed, forms a ridge or salient line between the fossulæ of the intermediate antennæ and that of the eyes, and which is prolonged beyond the end of the ocular pedicles. In the

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(1) *Hymenosoma orbicularis,* Desmar., Consid., xxvi, 1

INACHUS, Fab.,

The tail is always composed of six segments; all the tarsi are nearly straight, or but slightly arcuated; the ocular pedicles are smooth, susceptible of being concealed within their fossulæ, and there is a tooth or spine, at least in the males, at the posterior extremity of the latter cavities. Doctor Leach has considerably reduced the original extent of this group(1).

ACHÆUS, Leach.

Six segments in the tail, but the four posterior tarsi are arcuated or falciform; the ocular pedicles are always salient and present a tubercle anteriorly(2).

Next come those in which the epistoma is longer than it is broad, shaped like an elongated triangle truncated at the apex, and in which the origin of the mediate antennæ is separated by a considerable space from the superior margin of the buccal cavity. The ocular pedicles are always salient when the head is triangular and terminated in a point more or less bifid or entire.

STENORHYNCHUS, Lam.—*Macropodia,* Leach.

Six caudal segments in both sexes; anterior extremity of the shell bifid(3).

LEPTOPODIA, Leach.

Five segments in the tail of the male; one more in that of the female. The shell is prolonged anteriorly into a long, entire, and dentated point(4).

The latter Trigona differ from the preceding in the dissimilitude of their posterior feet.

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(1) *Cancer dodecos?* L.; *Inachus scorpio,* Fab.;—*Inachus Dorsettensis,* Leach, Malac. Brit., xxii, A;—*Inachus phalangium,* Fab.; *Inachus dorynchus,* Leach, Ib., xxii, 7, 8;—*Inachus leptorinchus,* ejusd., Ib., xxii, B; *Cancer tribulus,* L.? Near the Inachi comes a new genus lately established by M. Guerin, called Eurypode, minutely described and carefully figured, Mem. du Mus. d'Hist. Nat. XVI. It approaches that of Inachus, but the ocular pedicles are always salient; the post-abdomen is composed of seven completely separate segments in both sexes, and the penultimate joint of the feet, or the metarsus, is inferiorly dilated and compressed.

(2) *Achæus Cranchii,* Leach, Malac. Brit. xxi, C.

(3) *Macropodia tenuirostris,* Leach, Malac. Brit., xxiii, 1—5; *Inachus longirostris?* Fab.;—*Macrop. phalangium,* Leach, Ib., xxiii, 6.

(4) *Inachus sagittarius,* Fab.; Leach, Zool. Misc., lxvii.

Pactolus, Leach.

The four or six anterior feet simple, or without forceps. The internal extremity of the penultimate joint of the four posterior ones is prolonged into a tooth, forming with the last joint a forceps or didactyle hand. The form of the shell is that of the Leptopodiæ, and the tail presents the same number of segments; but the feet are much shorter; those of the third pair were wanting in the individual which served as the type of this section(1).

Lithodes, Lat.

The Lithodes, as to the form of the first eight pairs of feet, resemble the other Trigona; their length, however, seems progressively to increase from the second to the fourth, but the two last are very small, bent, but slightly visible, beardless, and apparently useless. The tail is membranous with three crustaceous and transverse spaces on the sides and another on the end, representing the segmentary divisions. The eyes are approximated inferiorly. The external foot-jaws are elongated and salient, and the shell is triangular, extremely spinous and terminated anteriorly by a dentated point. These Crustacea are peculiar to the Arctic Seas(2).

Our sixth section, that of the Cryptopoda(3) consists of Brachyura remarkable for a vaulted projection of the posterior extremities of their shell under which their feet, the two anterior or the claws excepted, can be completely retracted and concealed. The shell is nearly semi-circular or triangular. The superior edge of the forceps is more or less elevated and notched in the manner of a crest. In those species where they are largest, they cover the anterior part of their body, and hence the name of *Coq de mer* (Sea Cock), and *Crabe honteux* (Bashful Crab), which have been given to some of them. One sub-genus of this section, that of *Æthra* being closely allied by other characters with the Parthenopes of Fabricius, the first sub-genus of the preceding section, it follows, in a natural order the Cryptopoda should be placed between the Orbiculata and the Trigona.

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(1) *Pactolus Boscii*, Leach, Zool. Misc., lxviii.

(2) *Cancer maja*. L.; *Parthenope maja*, Fab.; *Inachus maja*, Id.; *Lithodes arctica*, Leach, Malac. Brit., xxiv. See also the *Maja camptschensis*, Tiles., Mem. Acad. St. Petersb., 1812, V, VI.

(3) Several of the Arcuata, such as the Hepati, Mursiæ, Matutæ, among the swimmers, have a crested forceps, and seem to be naturally allied to the Cryptopoda, so that this section should be placed higher in the scale. The same observation applies to the last one, or that of the Notopoda, for some of them approach the Arcuata, and others the Orbiculata and the Trigona.

CALAPPA, Fabr.

An extremely convex shell; the forceps triangular, strongly compressed, dentated superiorly like a crest, and perpendicularly covering the anterior part of the body, during the contraction of the feet. The third joint of the external foot-jaws is terminated like a hook, and the superior extremity of the buccal cavity is contracted and divided longitudinally into two cells by a septum.

n most of them, the two posterior and lateral dilatations of the shell are incised and dentated.

> One species, the *Calappe migrane*,—*Cancer granulatus*, L.; *Calappa granulata*, Fab.; Herbst., XIII, 75, 76, vulgarly styled *Coq de mer* and *Crabe hônteux*, is found in the Mediterranean. The shell is reddish and marked with two deep sulci, and unequal tubercles of a carmine red. That portion of the lateral margin which precedes the posterior dilatations, is at first nearly entire, and terminates by four very short teeth, the two first being most strongly marked; those of the edges of the dilatations are large, and six in number, two on the posterior margin, and the others lateral. There are two others on the front. The forceps are also furnished with red tubercles, and their crest is formed by seven teeth, the superior of which are acute(1).
>
> The others, such as the *C. voûté*—*Cancer calappa*, L.; *Calappa fornicata*, Fab.; Herbst., XII, 73, 74, have the marginal dilatations of the shell entire. This species inhabits the seas in the vicinity of Australia and the Moluccas.

ÆTHRA, Leach.

The Æthræ differ from the Calappæ in their very flat shell, in their forceps, which are not raised perpendicularly, and which do not overshadow the forepart of their body, and in the almost square form of the third joint of the external foot-jaws.

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(1) In this division come the following species of Fabricius: *C. tuberculata*, Herbst., XIII, 78; lviii, 1?—*C. lophos*, Herbst., XIII, 77;—*C. cristatus*, Herbst., xl, 3;—*C. marmoratus*, Herbst., xl, 2.—The *Guaja apara*, Pison and Marcgr., should probably be referred to this species, and according to the citation of Barère is the *Crabe des palétuviers* of the colonists of Cayenne. The *Cancer hepaticus* of Linnæus is also a Calappa.

Sometimes(1) the shell is a transversal oval, and at others(2) forms a short and very wide triangle laterally dilated and rounded. The claws are but slightly elongated, and are tolerably thick; here they are longer, angular, and remind us, as does also the form of the shell, of the Parthenopes. These latter species might constitute a separate subgenus.

Finally, our last and seventh division, that of the Notopoda, consists of Brachyura, whose last four or two feet are inserted above the level of the others, or which appear to be dorsal and look upwards. In those where they terminate by a sharp hook, they are usually employed by the animal in seizing various bodies, such as shells, Alcyonii, &c., with which it covers itself. The tail consists of seven segments in both sexes.

The tail of some of them, as in other Brachyura, is folded under, and their feet terminate in a sharp hook and are not fitted for natation.

Here the shell is nearly square, and terminates anteriorly in an advancing and dentated point, or it is sub-ovoid or truncated before. In the

Homola, Leach,

The eyes are supported by long pedicles closely approximated at base, and inserted under the middle of the front. The two posterior feet are alone turned up. The claws are larger in the males than in the females.

The shell is extremely spinous, with a dentated projection on the middle of the front. The superior foot-jaws are elongated and salient.

These Crustacea inhabit the Mediterranean, and were designated by Aldrovandus under the name of *Hippocarcini;* they are the *Thelxiopes* of Rafinesque. Some of the species attain a great size(3).

Dorippe, Fab.

The eyes widely separated and placed at the anterior and lateral angles of the shell; the four posterior feet turned up; the claws short in both sexes; the shell ovoid, widely truncated, without any projection like a rostrum, and flattened.

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(1) *Æthra depressa,* Lam., Hist. des Anim. sans Verteb.; *Cancer scruposus,* L.; *Cancer polynome,* Herbst., liii, 4, 5; Desmar., Consid., X, 2.

(2) *Parthenope fornicata,* Fab.

(3) *Homola spinifrons,* Leach, Zool. Misc., lxxxviii; *Cancer spinifrons,* Fab. See the article Homole, Nouv. Dict. d'Hist. Nat. Ed. II, and Desmar., Considér., XVII, 1. The *Dorippe Cuvieri,* Risso, belongs to this subgenus.

As remarked by Desmarest, we may observe on each side and above the origin of the claws an oblique fissure resembling a button-hole, longitudinally intersected by a diaphragm, ciliated, like itself, on the margin that communicates with the branchiæ, and affording an issue to the water that bathes them.

Three species are found in the Mediterranean(1); the others inhabit Oriental seas, and one of them *D. quadridens*, Fabr., Herbst., X, 70, is also obtained there in a fossil state.

There, the shell is sometimes nearly orbicular, or globular, and sometimes arcuated anteriorly and narrowed posteriorly, and dentated or spinous on the sides. The eyes are situated near the middle of the front and placed on short pedicles.

DROMIA, Fab.

The four posterior feet inserted in the back, and terminated by a double hook; the shell suborbicular or nearly globular, convex and woolly, or very hairy.

With their hind feet they seize upon Alcyonii, shells, and other bodies, beneath which they shelter themselves, transporting them wherever they go.

The most common species,—*Cancer dormia*, L., Rumph., Mus., XI, 1; Herbst., XVIII, 103, is found in every sea, that of the North excepted. It is covered with a brown down, and has five teeth on each lateral margin and three in front. The fingers are stout, deeply dentated on the two edges, and partly rose-coloured.. Some authors say that it is venomous.

The *Death's Head*,—*Cancer caput mortuum*, L.; *Dormia clypeata*, Act. Hafn., 1802, is smaller, more convex, almost globular, with three teeth on each side in its anterior margin, and has a short front, emarginate in the middle and laterally sinuous. It is found on the coast of Barbary(2).

DYNOMENE, Lat.

The two posterior feet much smaller than the others, alone dorsal, and apparently unarmed; the shell widened, and nearly resembling a reversed heart truncated posteriorly, like that of the last Quadrilatera, and simply pubescent. The ocular pedicles are longer than those of the Dromiæ.

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(1) *Dorippe lanata; Cancer lanatus*, L.; Desmar., Considér., XVII, 2;—*D. affinis*, Id.; Herbst., XI, 67;—*Cancer mascarone*, Herbst., XI, 68.

(2) For the other species see Desmar., *Consid. Gen. sur la Classe des Crust.*, p. 136, et seq.

But a single species, the *Dynomène hispide*, Desmar., Consid., XVIII, 2, is known; it is found at the Isle of France.

The last Notopoda differ from the preceding in the feet, all of which except the claws, terminate in a fin, and from all the Brachyura in the extension of their tail. Such is the

R[illegible]NINA, Lam.,

In which the elongated shell is gradually narrowed from before backwards, and usually resembles a reversed triangle with a dentated base. The ocular pedicles are extended, and the lateral antennæ long and projecting. The external foot-jaws are similarly lengthened and narrow, and the extremity of the third joint is compressed into a point. All the feet are closely approximated, or almost contiguous at their origin, and from the fourth pair ascend towards the back; the two last, however, are alone on it. The forceps are compressed, have the figure of a reversed triangle, and are dentated; the fingers are suddenly flexed.

These Crustacea are closely allied to the Albuneæ of Fabricius, the first sub-genus of the following family, and thus form the passage from the Brachyura to the Macroura. From the approximation of the feet it is even probable that the genital orifices of the female are situated as in the Macroura. According to Rumphius, they not only leave the water, but even climb to the tops of houses; from the form of their feet, however, this appears impossible, or at least very improbable.

A fossil species was described by Aldrovandus, which the Abbé Ranzani and M. Desmarest have since made better known(1).

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(1) *Ranina Aldrovandi*, Ranz., Mem. di Stor. Nat.; Desmar., Hist. Nat. des Crust. Foss., VI, xi, 1. The fig. x, 5, 6, appears to us to belong to a Hippa rather than to a Ramina;—*Ramina serrata*, Lam.; *Cancer raninus*, L.; *Albunea scabra*, Fab.; Rumph., Mus., VII, T.V.;—*Ranina dorsipes*, Lam,; *Albunea dorsipes*, Fab.; Rumph., Mus., X, 3; Desmar., Considér., XIX, 2.

The genus *Symethis*, Fab., is unknown to us, but we presume it is allied to the Raminæ, or to the first subgenera of the subsequent family.

FAMILY II.

MACROURA.—Exochnata, Fab.

In the Decapoda Macroura, the end of the tail is provided with appendages(1) which most frequently form a fin on each side; the tail itself is at least as long as the body, extended, exposed and simply curved towards its posterior extremity. Its under surface usually presents in both sexes five pairs of false feet, each terminated by two laminæ, or as many filaments. This tail is always composed of seven distinct segments. The genital orifices of the females are on the first joint of the third pair of feet. The branchiæ are formed of vesicular, bearded and hairy pyramids, arranged in several of them, either in two rows, or in separate fasciculi. The antennæ are generally elongated and salient. The ocular pedicles are usually short. The external foot-jaws are mostly narrow and elongated, resembling palpi, and do not wholly cover the other parts of the mouth. The shell is narrower and more elongated than that of the Brachyura, and usually terminates by a point in the middle of the front.

For more minute details we refer the reader to the precited memoir of Messrs Audouin and Edwards. These gentlemen have observed a character in the Lobster,—*Astacus*

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(1) These appendages consist of three pieces, one of which serves as a base or pedicle to the others, and is articulated with the penultimate segment; the latter, in conjunction with them, usually forms a fan-like fin; but in the last subgenera of this family these appendages are replaced by setaceous filaments. The false feet under the tail are similar in their structure to these natatory appendages. In the first subgenera they frequently do not exceed three or four pairs, and are smaller, or even null in the males, the two anterior ones always excepted; the Paguri, as it appears to me, only have them on one side: the terminal pieces are often unequal. In the succeeding ones, however, these feet are longer, and always form five pairs; the ova attached to them, and they are used by the animal in swimming. We observe that in the Macroura, where they are fewer in number, or less developed, as in those which we term the *Anomala*, the peduncle of the intermediate antennæ is longer in proportion than in the others, and that the two or four last four feet are smaller. These Crustacea, in some respects, seem also allied to the Brachyura.

marinus, Fab.—which, if it applied to the other Macroura, would be decisive; it is, that besides the two venous sinuses of which we have spoken in our general observations upon the order, there is a third, situated in the sternal canal between the two preceding ones and extending from one end of the thorax to the other. This curious arrangement, according to them, establishes a connexion between the venous system of the Macroura, and that of the Stomapoda.

The Macroura never quit the water, and, with the exception of a small number, are all marine Crustacea.

In imitation of De Geer and Gronovius, we will arrange them in a single genus(1), that of ASTAOUS, which we divide in the following manner:

Some, by the proportions, figure, and uses of their feet, of which the first, or at least the second pair, are in the form of claws, and by the subcaudal situation of their ova, evidently approach the preceding Crustacea, and approximate still more closely to those commonly known by the names of *Crawfish*, *Lobster*, and *Shrimp*.

The feet of the others are very slender, and are furnished with an exterior and elongated appendage or branch, which seems to double their number. They are exclusively adapted for natation, and none of them terminates in a forceps. The ova are situated between them, and not under the tail.

We will subdivide the former into four sections; the ANOMALA, the LOCUSTÆ, the ASTAOINA, and the CARIDES.

The latter will compose the fifth and last sections of this family, and of the Decapoda, or that of the SOHIZOPODA.

In the first, or the Anomala, the two or four last feet are always much smaller than the preceding ones. The under part of the tail is never furnished with more than four pairs of appendages or false feet(2). The lateral fins of the end of the tail, or the pieces which

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(1) The sections which we are about to describe might form so many generic divisions, having for their basis the genera of Fabricius.

(2) With the exception of the two that are anterior, these appendages in the males are mere rudiments, or are even wanting, a character common to the Galatheæ, Scyllari, and Palinuri. We should also observe that in these three subgenera the caudal fins are thinner or almost membranous at their posterior extremity. In this section, as well as in the Galatheæ, the thoracic portion to which the two posterior feet are attached forms a sort of petiole, so that these feet seem to be annexed to the tail.

represents them, are thrown on the side and do not form with the last segment a flabelliform fin.

The ocular pedicles are generally longer than those of the Macroura belonging to the following sections.

Here (the *Hippides*, Latr.), all the superior teguments are solid. The two anterior feet sometimes terminate in a monodactyle hand, or one without a finger, in the manner of a palette, and sometimes in a point; the six or four following ones end in a fin; the two last are filiform, reflexed, and situated at the inferior origin of the tail. The latter becomes suddenly narrowed immediately after the first segment which is short and broad; the last is in the form of an elongated triangle, and the lateral appendages of the penultimate in that of curved fins. There are four pairs of sub-caudal appendages, composed of a very slender and filiform stem. The antennæ are very pilose or strongly ciliated; the lateral first incline to the intermediate, and are then arcuated or contorted outwards.

ALBUNEA, Fabr.

The two anterior feet terminated by a very compressed triangular, monodactyle hand; the last joint of the following ones falciform. The lateral antennæ are short, and the intermediate ones are terminated by a single long and setaceous filament. The ocular pedicles occupy the middle of the front, and form, together, a sort of flat triangular snout, with the external sides arcuated. The shell is almost plane, and nearly square; the posterior angles are rounded, and their anterior margin finely dentated.

The only well known species, *Cancer symnista*, L.; *Albunea symnista*, Fabr., Herbst., XXII, 2; Desmar., Considér., xxix, 3, inhabits the Indian Ocean(1).

If the *Cancer carabus* of Linnæus belong to the same subgenus, a species would be found in the Mediterranean.

HIPPA, Fab.—EMERITA, Gronov.

The two anterior feet terminated by a strongly compressed, nearly ovoid and adactyle hand; the lateral antennæ much shorter than the intermediate, and contorted; the latter terminated by two short, obtuse filaments placed one on the other; the ocular pedicles long and filiform, and the third joint of the foot-jaws very large and laminiform, emarginated at the end and covering the ensuing joints. The shell is nearly ovoid, convex, and truncated at both ends.

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(1) M. Desmarest hesitatingly places the genus *Posydon* of Fabricius, who speaks of two species, near the Albuneæ; but according to the latter the anterior antennæ are bifid, a character which does not belong to the Albuneæ. Owing to the imperfect manner in which he describes this genus, we are not able to recognize it, or to appreciate its affinities.

The last joint of the second feet and of the two following pairs is triangular, but approaching, in the latter at least, to the form of a crescent; the two last of the fourth pair are turned up, and laid on the two preceding ones; the first segment of the tail is marked with two impressed and transverse lines(1).

REMIPES, Lat.

The two anterior feet elongated, the last joint conical, compressed, and hairy; the four antennæ closely approximated, very short, and nearly of an equal length, the intermediate ones terminated by two filaments; ocular pedicles extremely short and cylindrical; external foot-jaws in the form of small claws, thinned and arcuated at the end, and terminated by a stout hook. The shell is shaped like that of the Hippæ.

The last joint of the second and third feet forms a triangular blade, with an emargination in its external side; the same joint of the fourth is triangular, narrow, and elongated. As in the Hippæ, the first caudal segment presents two impressed and transverse lines.

Two species are known; one from the Australian Seas(2), and the other from the Antilles, and the coast of Brazil.

There (the *Pagurii*, Latr.), the teguments are somewhat crustaceous, and the tail is most commonly soft, contorted, and in the form of a sac. The two anterior feet terminate in a didactyle hand, the four following ones in a point, and the four posterior, which are shorter, in a sort of forceps or little didactyle hand. The first joint of the peduncle of the lateral antennæ presents a pointed or spiniform appendage or projection.

These Crustacea, termed *Carcinion* by the Greeks, and *Cancelli* by the Latins, usually inhabit empty univalve shells. Their tail, that of the Birgi excepted, presents but three false feet, (in the females only), situated on one of the sides, each of which is divided into two filiform and hairy branches. The three last segments are suddenly narrowed. In some of them, such as the

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(1) *Hippa adactyla*, Fab.; *H. emeritus*, Id.; *Cancer emeritus*, L.; *Emerita*, Gronov., Zoop., xvii, 8, 9; Herbst., xxii, 3; Desmar., Considér., xxix, 2, in the seas of both Indies.

(2) *Remipes testudinarius*, Latr.; Desmar., Consid., xxix, 1; Cuv., Règne Animal, IV, xii, 2.

Birgus, Leach,

The tail is tolerably solid, suborbicular, and is furnished beneath with two rows of laminiform appendages. The fourth feet are but a little smaller than the two preceding ones; the two last are folded and concealed, their extremities being received into a depression at the bottom of the thorax; the fingers at the extremity, as well as those of the penultimate pair, are hairy or spinous. The claws excepted, all the feet are visibly separated at their origin. The thorax has the figure of a reversed heart, and is pointed anteriorly.

It appears that from their size, the form of their tail, and the more solid consistence of their teguments, the Birgi are unable to shelter themselves in shells. They must retreat to holes, or fissures in the rocks.

The best known species, *Cancer latro*, L., Herbst. XXIV; Rumph., Mus., IV; Seba, Thes., III, xxi, 1, 2, according to the Indians, feeds on cocoa-nuts which it obtains during its nocturnal excursions for that purpose(1). In the others, or the

Pagurus, Fab.,

The last four feet are much shorter than the preceding ones, and the forceps are covered with granules. The tail is soft, long, cylindrical, narrowed near the extremity, and has usually but a single row of filiform oviferous appendages. The thorax is ovoid or oblong.

With the exception of some species domiciliated in sponges, Serpulæ and Alcyonii, they all inhabit univalve shells, whose aperture they close with their anterior claws, and most frequently with one of their fingers, which is usually larger than the other. It is asserted that the female spawns twice or thrice in the year.

Some species, Cænobita, Latr.; distinguished from the others by their projecting antennæ, of which the mediate are nearly as long as the external or lateral, and are furnished with elongated filaments, whose thorax is ovoido-conical, narrow, elongated, strongly compressed on the side, with the anterior cephalic portion shaped like a heart, establish their domicil in terrestrial shells on rocks near the sea, whence, at the approach of danger, they roll down with them(2).

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(1) *Pagurus laticauda*, Cuv., Règn., Anim., IV, xii, 2; Desmar., Considér., p. 180, from the Isle of France. Very curious facts relating to the anatomy of the preceding species have been published by M. Geoffroy Saint-Hilaire, from which however we do not draw similar conclusions.

(2) *Pagurus clypeatus*, Fab.; Herbst., xii, 2.

The true Paguri—PAGURUS, Latr.—on the contrary, have the mediate antennæ curved, much shorter than the lateral ones, with the two filaments short, the superior forming an elongated or subulated cone; the anterior division of the thorax is square, or forms a reversed and curvilinear triangle. They inhabit marine shells.

The *Hermit*,—*Cancer Bernhardus*, L., Herbst., XXII, 6; *Pagurus streblonyx*, Leach, Malac. Brit., XXVI, 1—4,—is of a mean size. Its two claws are bristled with spines, with the forceps almost in the shape of a heart, the right one being the largest. The last joints of the ensuing feet are also spinous. It is very common in European seas. A second but fossil species, the *Pagure de Faujas*,—Desmar., Hist. Nat. des Crust. Foss., XI, 2,—is closely allied to it.

A third species, the *Pagurus angulatus*, Risso, Crust. de Nice, I, 8; Desmar., Considér., XXX, 1, is remarkable for its forceps, which are strongly sulcated with longitudinal ridges. The right one is the largest(1).

A fourth from the same sea is removed from the preceding by several characters, and merits the distinction of forming a separate subgenus, the PROPHYLAX, Latr. The tail, with the exception of the superior surface of the three last segments, instead of being soft and arcuated and having but a single range of oviferous filaments, is covered with a coriaceous tegument, is straight, and is only curved beneath at its extremity; its inferior surface presents a groove and two rows of false feet. The body also is linear, and the two lateral appendages of the end of the tail are almost equal, the larger division being foliaceous and ciliated. The last four feet are slightly granulated at their extremity, and appear to be terminated by a single finger, or at least are not distinctly bifid. Perhaps we should refer to this division those Paguri which inhabit the Serpulæ, and Alcyonii, such as the *Pagurus tubularius*, Fab.

In all the following Macroura, the two posterior feet at most are smaller than the preceding ones. Most generally the sub-caudal false feet form five pairs. The teguments are always crustaceous. The lateral fins of the penultimate segment of the tail, and its last, form a common one arranged like a fan.

The two subsequent sections possess a common character, which

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(1) For the other species see the article *Pagure*, Encyc. Méthod.; the Atlas d'Hist. Nat., of the same work; Desmarest, Considér. Gener. sur la Classe des Crust.; the plates of the Voy. de Freyoinet. We should observe that in the figure of the *Cancer megistos*, Herbst., LXI, 1, the tail is false; this arises from the fact that the tail was wanting in the individual from which the drawing was made, the artist supplying it by copying the fin-tail of an ordinary Macroura.

separates them from the fourth or that of the Carides. The antennæ are inserted at the same height, or on a level; the peduncle of the lateral ones, when accompanied by a scale, is never entirely covered by it. There are frequently but four pairs of sub-caudal false feet. The two mediate antennæ are always terminated by two filaments only, usually shorter than their peduncle, or scarcely any longer. The external leaflet of the natatory appendages of the penultimate segment of the tail is never divided by a transverse suture.

In our second section, or the LOCUSTÆ, so called from the name *Locusta* given by the Latins to the most remarkable Crustacea of this division, and from which is derived that of *Langouste* applied to them in France, there are never more than four pairs of false feet. The posterior extremity of the fin that terminates the tail, is always nearly membranous, or less solid than the rest. The peduncle of the mediate antennæ is always longer than the two terminal filaments, and more or less bent or geniculate; the lateral ones are never furnished with scales; sometimes they are reduced to a single peduncle which is dilated, very flat, and in the form of a crest; sometimes they are large and long, terminating in a point and bristled with spines. All the feet are nearly similar and end in a point; the two first are merely somewhat larger; their penultimate joint and that of the two last are at most unidentated, but without forming with the last a perfectly didactyle hand. The pectoral space included between the feet is triangular; the thorax is almost square or sub-cylindrical, and without any frontal prolongation or rostrum.

SCYLLARUS, Fab.

The Scyllari, or Sea-Grasshoppers as they are called, present a very unusual character in the form of their lateral antennæ; the stem is wanting and the joints of the peduncle, very much dilated transversely, form a large, flattened, horizontal crest more or less dendated.

The external branch of the sub-caudal appendages is terminated by a leaflet; but the internal one, in some of the males, is a mere tooth.

Doctor Leach has established three genera of them, founded on the proportions and form of the thorax, the position of the eyes, and some other parts. They are,

1. SCYLLARUS, where the thorax is as long as it is broad or longer, and without any lateral incisure, the eyes always situated near its anterior angles; the penultimate joint of the two posterior feet unidentated in the females. They excavate holes in the clayey soil near the shore which serve them for habitations.

In one of them, the *Scyllare ours; Cancer arctus*, L.; *Cigale de mer*, Rondel., livr. XIII, chap. VI; Herbst., XXX, 6, the external or lateral antennæ are much dentated. The thorax is marked with three longitudinal and dentated ridges, and the superior surface of the tail sculptured, but its lateral margin not crenulated.

The other, *Scyllarus æquinoxialis*, Fab.; *Scyllarus orientalis*, Risso; *Squille large*, or the *Orchetta*, Rondel.; Gesn., Hist. des Anim., III, p. 1097, is large, shagreened, and without ridges. The crests are edentated, and the margin of the segments of the tail crenulated. Its flesh is highly esteemed and the ova are of a vivid red.

2. Thenus, where the fore part of the thorax is broader than it is long, each lateral margin deeply incised, and the eyes are placed at its anterior angles(1).

3. Ibacus, only differing from Thenus in the position of the eyes, which are approximated to the origin of the intermediate antennæ.

In an Australian species, *Ibacus Peronii*, Leach, Zool. Miscel., CXIX; Desmar., Consid., XXX, 12, the exterior lateral margin of the third joint of the external foot-jaws is transversely striated and notched in the manner of a crest(2). In the

Palinurus, Fab.

The lateral antennæ are large, setaceous, and bristled with spines.

Of these Crustacea, called *Carabos* by the Greeks, and *Locusta* by the Latins, and on which Aristotle made several important observations, some attain a length of nearly two metres, the antennæ included. The species found in European seas remains in deep water during the winter, and only visits the coast on the return of spring. Rocky localities are its favourite haunts. It subsequently deposits its ova, which are of a beautiful red colour, whence their name of *Coral*. At this period more males are taken than females, while after the spawning season the latter are most abundant. According to Risso a second copulation, followed by another production of ova, takes place in the month of August. The Palinuri are disseminated throughout all the seas of the temperate and intertropical zones, but are particularly abundant in the latter. Their shell is rough, covered with prickles, and armed in front with stout, projecting, and more or less numerous spines or teeth. Its colour, as also that of the tail, consists of an agreeable mixture of red, green, and yellow. The tail frequently presents transverse bands or spots, sometimes ocellated, arranged in regular series. Their flesh, that of the females particularly, before and after the spawning season, is highly esteemed.

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(1) *Thenus indicus*, Leach; *Scyllarus orientalis*, Fab.; Rumph., Mus., II, D.; Herbst., XXX, 1; Encyc., Atl. d'Hist. Nat., CCCXIV; Desmar., Consid., XXXI, 1.

(2) Add *Scyllarus antarcticus*; Fabr., Herbst., xxx, 2; Rumph., Mus., II, D. See the article *Scyllare*, Encyc. Méthodique.

In the species taken on the coast of France, and probably in others, the extremity of the penultimate joint of the two posterior feet of the female is provided with a tooth or spur peculiar to the sex. The same observation applies to the Scyllari.

> *Palinurus quadricornis*, Fab.; *Astacus elephas*, Herbst., xxix, 1; Leach, Malac. Brit., xxx, or the *Langouste commune* of the French, is sometimes half a mètre in length, and when loaded with ova weighs from twelve to fourteen pounds. The shell is spinous and downy, with two stout teeth notched beneath, before the eyes. The superior surface of the body is of a greenish or reddish brown; the tail is spotted and dotted with yellowish, and its segments are marked by a transverse sulcus interrupted in the middle, its lateral edges forming a dentated angle. The feet are picked in with red and yellowish. It inhabits the coasts of France, that of the Mediterranean in particular. It is found fossil in Italy(1).

The third section, that of the ASTACINI, Latr., is distinguished from the preceding by the form of the two anterior feet, and frequently by that of the two following pairs, which terminate in a forceps with two blades, or a didactyle hand. In some, the last two, or four, are much smaller than those which precede them, therein approaching the Anomala; but the fan-like fin of the extremity of their tail and other characters remove them from that section. The thorax is narrow anteriorly, and the front projects in a pointed snout or rostrum.

Some of them,—*Galathadeæ*, Leach, as well as the preceding Macroura, have four pairs of false feet; the mediate antennæ flexed like

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(1) M. Desmarest, Hist. Nat. des Crust. Foss., p. 132, speaks of two other fossil species, the second of which, however, may probably belong to the subgenus Astaceus properly so called, and approach the *A. norwegicus* of Fabricius.

For the other living species, see Ann. du Mus. d'Hist. Nat., t. III, p. 391, et seq.; the article *Palinure*, Encyc. Méthod., and its Atlas d'Hist. Nat.; that of *Langouste*, Nouv. Dict. d'Hist. Nat., Ed. II, and the same in the work of Desmarest on the Crustacea. As respects the nervous system of the species that inhabits the French coast, see Audouin and Edwards, op. cit.; according to them, all the thoracic ganglions are as if soldered together, end to end.

an elbow, with the two filaments representing the stem, are manifestly shorter than their peduncle. That of the lateral antennæ is never provided with a lamina in the form of a scale. The two anterior feet alone terminate in a didactyle hand, which is frequently much flattened. The last segment of the tail is bilobate, at least in most of them.

At the head of this division come those whose(1) posterior feet are much smaller and thinner than the preceding ones; they are filiform, bent up, and useless in locomotion. In the

GALATHEA, Fab.

The tail is extended, the thorax nearly ovoid or oblong, the mediate antennæ salient, and the forceps elongated. The superior surface of the body is usually deeply incised or striate, spinous and ciliate. The most remarkable species of the European seas are the

Galathea rugosa, Fab.; *Leo*, Rondel., Hist. des. Poiss., p. 390; Penn. Brit. Zool., IV, xiii; Leach, Malac. Brit., XXIX, the claws of which are long and cylindrical, the mandibles edentate, and that has three long spines in the middle of the front, directed forwards, and ten similar and equally projecting ones on the tail, six on the second segment, and four on the following one(2).

Galathea strigosa; Cancer strigosus, L., Herbst., XXVI, 2; Pennt. Brit. Zool. IV, xiv; Leach, Malac. Brit., XXVIII, B. Similar, as respects the mandibles, to the preceding species, but having a projection in front, or a rostrum, with four teeth on each side, and an eighth at the end; the claws are large, but neither very long nor linear, and very spinous, as is a great part of the following feet. This last character distinguishes it from a third species, also found in European seas, the *Galathea squamifera*, Leach., Malac. Brit., XXVIII, B.

This learned entomologist has made a peculiar genus, GRIMOTEA, of the *Galathea gregaria* of Fabricius. The second joint of the intermediate antennæ terminates in a club, and the three last external foot-jaws are foliaceous. It is of a red colour, and was discovered by Sir Joseph Banks in his voyage round the world. It collected in such immense numbers that the Ocean seemed to be of one blood-red colour.

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(1) According to a verbal communication from Doctor Leach, in the *Gaalthea amplectens*, Fab., it is not only the two posterior feet which are smaller, but the penultimate likewise. This species would then form a separate genus.

(2) This species forms the genus MUNIDA, Leach. See Desmar., Considér., page 191. The latter is mistaken however in attributing to the former the credit of having been the first to discover the identity of this species with the *lion* of Rondelet. See my Hist. Gener. des Crust. et des Insectes., t. VI, p. 198.

The *Æglea*, Id., is only distinguished from the preceding genus, and from Galathea, by the dentation of the mandibles, by the second joint of the external foot-jaws being shorter than the first, and by the surface of the body being generally smooth(1).

That which Risso first named CALYPSO, and subsequently JANIRA, in the opinion of Desmarest,—Considér., p. 192, does not differ from Galathea.

PORCELLANA, Lam.

The Porcellanæ form a singular exception among the Macroura, with respect to their tail, which is doubled under as in the Brachyura. They are otherwise removed from the Galatheæ by the more abbreviated, suborbicular, or almost square form of their thorax; by the mediate antennæ, which are sunk in their fossulæ, by their triangular forceps; and finally, by the internal dilatation of the inferior joints of their external foot-jaws. Their body is very flat.

They are small, slowly-moving Crustacea, found in every sea, which conceal themselves under stones near the shore.

Doctor Leach has formed a genus with certain species—*hexapus* Latr.;—*longicornis*, Id.,—*Bluteli*, Risso, Crust., I, 7, &c., which he calls PISIDIA. According to Desmarest, however, it does not differ in any appreciable character.

Some of them are remarkable for their extremely large and pilose or ciliated forceps. Such are, 1. The *Porcellane larges pinces; Cancer platycheles*, Penn., Brit. Zool., IV, vi, 12; Herbst., XLVII, 2, where only the external margin of the forceps is pilose and the nearly naked thorax is rounded; it is found on the rocks in the seas of Europe. 2. The *P. hirta*, Lam., the whole superior surface of whose forceps and thorax is pilose, and where the latter is nearly oval and becomes thinner anteriorly. It was brought from King's Island by Messrs Péron and Lesueur.

The forceps of the others are glabrous. Such is the *Cancer hexapus*, L.; Herbst. XLVII, 4. The thorax is marked with short, transverse, and slightly ciliated lines; the front trifid, with its middle tooth finely notched. The claws are covered with little blood-red scales and granules, the fingers separated and without internal dentations. It inhabits European seas(2).

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(1) *Æglée lisse*, Desmar., Considér., xxxiii, 2; Latr., Encyclop. Méthod., Atl., d'Hist. Nat. cccviii, 2.

(2) See the article *Porcellane*, Nouv. Dict. d'Hist. Nat., Ed., II; and Desmar., Consid., sur les Crust., p. 192—199.

The genus Monolepis, Say,—Journ. of the Acad. of Nat. Sc. of Philad., I, 155; Desmar., Consid., p. 199 and 200, appears to constitute the passage from the Porcellanæ to the Megalopes. It approaches the first in the two posterior feet, and in the direction of the tail. But this tail has but six segments, and the eyes are very large as in the second. It would also appear that the lateral fins of the end of the tail resemble those of the latter.

The remaining Crustacea of the same division differ from the preceding in their posterior feet, which are similar to their preceding ones in form, proportion and uses, or equally ambulatory. They are also removed from them by the greater thickness and height of the body, the shortness of the lateral antennæ, the smallness of the claws, the large eyes, and lateral fins of the tail which are composed of a single lamina. This tail is extended, narrow, and simply bent under near its extremity.

Megalopus, Leach.—*Macropa*, Latr., Encyc.

Four species are known, three of which inhabit European seas and the fourth the Indian Ocean(1) whence it was sent to Paris by the late M. Leschenault and Messrs Quoy and Gaymard.

In our second division of the Astacini, Latr., will be comprised those which have five pairs of false feet, the mediate antennæ straight or nearly so, salient, projecting, and terminated by two filaments as long as their peduncle, or longer; and which, a single subgenus excepted—Gebia—have the four or six anterior feet terminated by a didactyle hand.

Their tail is always extended; their two posterior feet are never more slender than the preceding ones, nor folded. The peduncle of the lateral antennæ is frequently accompanied by a scale.

Some of them, as well as others of the ensuing section, inhabit fresh water.

Those in which the first four feet, at most, terminate in two fingers; whose lateral antennæ never have a scale at the base; and where the external leaflet of the lateral fins of the end of the tail presents no transverse suture, will form a first subdivision. Most of their feet are ciliated or pilose. They inhabit salt-water and conceal themselves in holes which they excavate in the sand.

Sometimes the index or immovable finger—formed by a projection of the penultimate joint, of the claws, is very evidently shorter than the thumb or movable finger, merely constituting a simple tooth. The

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(1) For the European species, see Desmar., Consid., p. 200--202, and pl. xxxiv, 2, of the same work.

GEBIA, Leach,

Approaches the preceding sub-genera in the two anterior feet which are alone didactyle. The leaflets of the lateral fins of the end of the tail widen from the base to their extremity, and are marked with longitudinal ridges. The intermediate piece or the last segment of the tail is nearly square(1).

THALASSINA, Lat.

The four anterior feet terminated by two fingers; leaflets of the lateral fins of the end of the tail, narrow, elongated, and without ridges; the last caudal segment or intermediate portion forming an elongated triangle(2).

Sometimes the four anterior feet, or the two first and one of the second(3) are terminated by two elongated fingers, forming a complete forceps.

The two anterior claws are the largest; the lateral leaflets of the fin terminating the tail, are in the form of a reversed triangle, or widest at the posterior margin; the intermediary, on the contrary, is narrowed from base to apex, and terminates in a point.

CALLIANASSA, Leach.

The claws of the Callianassæ are very unequal, both as to form and proportion; the carpus of the largest of the two anterior ones is transversal, and forms a common body with the forceps; the same joint of the other claw is elongated; the two posterior feet are almost didactyle. The external leaflet of the lateral fins at the end of the tail is larger than the internal, and has a ridge; the latter is smooth.

The ocular pedicles are squamiform, and the cornea is situated near the middle of their external margin. The filaments of the mediate antennæ are not longer than their peduncle.

> *Callianassa subterranea*, Leach, Malac. Brit., XXXII, is the only known species. It is found on the coasts of France and England. The

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(1) *Thalassina litoralis*, Risso, Crust., III, 2;—*Gebia stellata*, Leach, Malac. Brit., xxxi, 1—9. See Desmar., Consid., p. 203, 204.

(2) *Thalassina scorpionides*, Lat.; *Cancer anomalus*, Herbst., LXII; Leach, Zool. Miscel., CXX X; Desmar., Consid., XXXVI.

(3) The left claw of the second pair seems to be monodactyle in the Callianassæ, and the penultimate joint dilated into a palette.

Axius, Leach,

Differs from Callianassa in the claws, which are nearly equal, and in the carpus, which does not form part of the forceps; the posterior feet are similar to the preceding ones. The leaflets of the lateral fins are nearly equal in size, and have each a longitudinal ridge. The filaments of the mediate antennæ are evidently longer than their peduncle. The

> *Axius stirhynchus*, Leach, Malac. Brit., XXXIII, is found on the coast of England, and on that of the western departments of France, where it was observed by M. d'Orbigny, sen., a corresponding member of the Mus. d'Hist. Nat.

Our second and last subdivision consists of Crustacea whose six anterior feet form as many claws, terminating in a perfectly didactyle forceps, a character which distinguishes them from all the preceding Decapoda, and one which approximates them to the first of the ensuing section; but here the claws of the third pair are the largest, whereas there, it is the two first, besides which they are much thicker. The peduncle of the lateral antennæ is accompanied by a scale or spines. The external leaflet of the lateral fins at the end of the tail, in all the living species, is divided in two by a transverse suture(1). In the

Eryon, Desmar.,

All the leaflets of the caudal fin are narrowed at their extremity and terminate in a point; the external one presents no transverse suture. The two filaments of the mediate antennæ are very short, and hardly longer than their peduncle. The sides of the shell are deeply emarginated.

The forceps of the two anterior claws are narrow and elongated.

This subgenus was established by Desmarest on a fossil species,—*Eryon Cuviéri*, Hist. Nat. des Crust. Foss., X, 4; Consid. XXXIV, 3, found in a lithographic, calcareous stone from Pappenheim and Aichtedt in the margraviate of Anspach.

Astacus, Gronov., Fab.

Leaflets of the lateral fins at the end of the tail widened and rounded at their extremity; the external one divided transversely by a suture, and the posterior extremity of the mediate obtuse or rounded. The two filaments of the mediate antennæ are much longer than their peduncle. The sides of the shell are entire or not incised.

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(1) This character is common to the following section, so that by it we might divide the Macroura, the Schizopoda excepted, into two great divisions.

In some, all inhabiting salt water, the last segment of the tail, or that which occupies the middle of the terminal fin, presents no transverse suture.

Those whose lateral antennæ have a large scale on their peduncle, whose eyes are very large and reniform, and the forceps of whose two anterior claws are narrow, elongated, prismatic, and equal, form the genus NEPHROPS of Leach, the type of which is the *Cancer norwegicus*, L.; de Geer, Insect., VII, XXI; Herbst., XXVI, 3; Leach, Malac. Brit., XXVI. The two anterior claws are furnished with dentated spines and ridges, and the superior surface of the tail is sculptured. It is found in the seas of the north of Europe and in the Mediterranean.

Those in which the peduncle of the lateral antennæ presents nothing but two short projections in the form of teeth or spines, whose eyes are neither large nor reniform, and whose forceps are more or less oval, compose, with the fresh water species, the genus *Astacus*, properly so called, of the same author.

> *Astacus marinus*, Fab.; *Cancer gammarus*, L.; Herbst., XXV; Penn., Brit. Zool., V, x, 21; (the Common Lobster). The point or rostrum of the anterior extremity of the shell has three teeth on each side, and another double one at its base. The anterior claws are very large and unequal; the largest finger of the forceps is oval, with great molar teeth, the other is elongated, and has numerous small ones. Old individuals are sometimes more than half a metre in length. Its flesh is highly esteemed. It is found in the European Ocean, in the Mediterranean, and even on the eastern coasts of North America. Its internal structure has been carefully studied by Messrs Victor Andouin, and Milne Edwards.

In the fresh water species, which otherwise resemble the preceding in their antennæ, eyes, and form of the claws, the last segment of the tail, or the middle one of its terminal fin, is transversely divided by a suture. The

> *Astacus communis; Cancer astacus*, L.; Rœsel, Insect., III, liv, vii. The Craw-Fish has its anterior forceps granulated, and the inner edges finely dentated. There is a tooth on each side of the snout, and two at its base; the lateral edges of the segments of the tail form an acute angle. Its colour, which is usually a greenish brown, is sometimes altered by accidental circumstances.

This species, which inhabits the fresh waters of Europe, has been more particularly studied, both as respects its anatomy and habits, and the faculty enjoyed by the Crustacea of regenerating their antenæ and feet when they are either mutilated or destroyed. When about to cast its shell, two stony concretions are found in the stomach, formerly much used in medical practice as an absorbent, but now replaced by the carbonate of magnesia. It conceals itself in holes, or under stones, never quitting its retreat except to search for food, which consists of small Mollusca and Fishes, and the larvæ of Insects. It also feeds on putrid flesh, the carcases of quadrupeds, for instance, which are placed as a bait for them in nets, or in the centre of fagots of wood. They are also taken in their holes by the light of torches. It changes its shell towards the end of spring. Two months after coition, which takes place ventribus junctis, the female produces her ova, which are at first collected in masses, and glued to the false feet by means of a viscid humour. They are of a reddish brown colour, and enlarge before they are hatched. The young Astaci, at first extremely soft and precisely like their parent, shelter themselves under her tail and remain there several days, until their bodies acquire a certain degree of solidity.

The term of existence assigned to the Astaci seems to be twenty years and upwards, their size augmenting in proportion to their age. Those are preferred for the table which inhabit running streams of fresh water. A parasitic animal belonging to the Annelides, is found on their branchiæ, long ago observed by Rœsel, but imperfectly known until the researches of M. Odier(1).

The fresh-waters of North America produce another species, the A. *Bartonii*, figured by Bosc.—Hist. Nat. des Crust., II, x, 1.

A third inhabits the rice-fields of the same country, to which, according to Major Le Conte, one of the best naturalists of the United States, it is very injurious.

In the fourth section, that of the Carides, the intermedial antennæ are superior or are inserted above the laterals: the peduncle of these latter is completely covered by a large scale.

Their body is arcuated, almost gibbous, and of a less solid consistence than that of the preceding Crustacea. The front is always drawn out into a point, and most frequently so as to resemble a rostrum or pointed lamina compressed and dentated along the edges.

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(1) See his *Memoire sur le Branchiodelle*, inserted in the Mém. de la Soc. d'Hist. Nat. tome I, p. 69, et seq.

The antennæ always project; the laterals are usually very long and resemble very fine setæ; the intermediaries of a great number terminate in three threads. The eyes are closely approximated. The external foot-jaws, more elongated and narrow than usual, resemble palpi or antennæ. The mandibles of most of them are compressed and arcuated at the extremity. One of the first pairs of feet is frequently flexed upon itself. The segments of the tail are dilated or widened laterally. The external leaflet of its terminal fin is always divided in two by a suture, a character observed nowhere else except in the last Crustacea of the preceding section; the azygous portion of the middle, or the seventh and last segment is elongated, narrowed near the extremity and provided above with ranges of small spines. The false feet, of which there are five pairs, are elongated and usually foliaceous.

Immense numbers of these Crustacea are consumed in all parts of the world. Some species are even salted in order to preserve them.

In some of them, the three first pairs of feet form a didactyle claw, the length of which progressively augments, so that the third pair is the longest. Such are the

PENÆUS, Fab.,

Where there is no annular division in any of the joints of the feet.

Their mandibular palpi are turned up and foliaceous. A little elliptical appendage may be seen at the base of the feet, a character which seems to approximate them to Pasiphæa, the last genus of this section, and to those of the following one.

Some, all indigenous to Europe, on account of the shortness of the two threads of their intermediate antennæ, form a first division. It contains the following species.

P. sulcatus; Palæmon sulcatus, Oliv., Encyclop.; *Caramote*, Rond., Hist. Nat. des Poiss., liv. xviii, chap. 7. Nine inches long; on the middle of the thorax a longitudinal carina bifurcated at base, terminated by a projecting rostrum, compressed, with eleven teeth in its upper edge and one in the lower; a longitudinal sulcus along each side of the carina.

This species is very common in the Mediterranean and the object of considerable commerce. It is salted and shipped to the Levant. The P. *trisulcatus*, Leach, Malac. Brit. XLII, which inhabits the coast of England, is perhaps a mere local variety of the sulcatus. Its thorax is trisulcate and the rostrum bidentate beneath. In the P. *d'Orbigny*,—Lat, Nouv. Dict. d'Hist. Nat., Ed. II, article Pénée, the carina is not sulcated.

The intermediate antennæ of others are terminated by long threads; they constitute our second division to which we refer.

Penæus monodon, Fab.; *Squilla indica*, Bont., Hist. Nat., p. 81, which inhabits the Indian Ocean.

P. antennatus, Risso, Crust., II, 6, and *P. mars*, Id., II, 5, also appear to belong to it.

STENOPUS, Lat.

Distinguished from the Penæi by the transverse and annular divisions of the two penultimate joints of the four posterior feet.

The entire body is soft; the antennæ and feet are long and slender, those of the third pair widest.

But a single species is known. It was brought from the seas of New Holland by M. Péron and Lesueur. Olivier retains it in the genus Palæmon—*Cancer setiferus*, L.; *P. hispidus*, Oliv., Encyclop. and Atl., d'Hist. Nat., CCCXIX, 2; Seba, Mus., III, XXI, 6, 7; Herbst., XXXI, 3, where I first placed it.

The remaining Carides, the intermediate antennæ of many of which are terminated by three threads, have at most but two pairs of didactyle claws formed by the four anterior feet.

A subgenus founded on a single species peculiar to North America, that of

ATYA, Leach,

Is removed from all analogous Crustacea by an anomalous character. The forceps terminating the four claws is cleft down to its base, or seems to be composed of two fingers in the form of thongs united at their origin; the preceding joint is crescent-shaped. The second pair is the largest. The intermediate antennæ have but two threads.

In all the following subgenera, the blades of the forceps originate at a certain distance from the base of the penultimate article, or of that which has the form of a hand; the body or the part that precedes it is not lunulated.

We now have in the first instance those Carides whose feet are generally robust and not filiform, and which have no appendage to their external base. Their body is neither very soft nor greatly elongated.

Among these subgenera, whose feet are deprived of this appendage, the three following present an insulated form with respect to their claws.

CRANGON, Fab.

The two anterior claws, which are larger than the subsequent feet, have but a single tooth in place of the index or immovable finger, and that which is movable is bent and hooked.

The superior or intermediate antennæ have but two threads. The second feet are folded up, and are more or less distinctly bifid or didactyle at their extremity; neither of the joints is annulated. The rostrum is very short.

We do not separate the EGEON, Risso, or the PONTOPHILUS, Leach, from Crangon. In the former, the last joint of the external foot-jaws is twice the length of the preceding one, while in the latter they are equal. The second feet of the Egeones are shorter than the third and the smallest of the whole number, whilst in Crangon their length is the same. Besides, as the number of species is very limited, this generic distinction becomes the less necessary.

> *C. vulgaris*, Fab.; Rœs., Insect., III, lxiii, 1, 2. (The Shrimp), about two inches long. It is smooth, of a pale glaucous green, dotted with grey. That part of the thorax which supports the third pair of feet, projects in a point. This species is very common on the oceanic coast of France, where it is vulgarly called the *Cardon*. It is taken there annually in nets. Its flesh is delicate, and highly esteemed. In the same locality, though rarely, according to M. Brébisson, is found the *C. ponctué de rouge*, of Risso; but I consider it, with him, as a mere variety. The *C. loricatus—Egeon loricatus*, Risso; *Cancer cataphractus*, Oliv., Zool., Adriat., III, 1, has three longitudinal and dentated ridges on the thorax.
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> Northern seas produce a large species, the *Crangon boreas*, Phipps., Voy. to the North Pole, pl. xi, 1, Herbst. XXIX, 2.

PROCESSA, Leach.—*Nika*, Risso.

One of the two anterior feet simply terminating in a point, the other in a didactyle claw; the two following are unequal, slender, and also didactyle. One of these second feet is very long, its carpus and the preceding joint being annulated, a character which on the other foot is only found in the first of these joints. The fourth pair of feet are longer than the preceding and two following ones. The superior antennæ have but two threads.

> *P. edulis; Nika edulis*, Riss., Crust., III, 3, is of a flesh colour dotted with yellowish; a line of small yellow spots in the middle. The anterior extremity of the shell is furnished with three sharp points, the intermediate of which, or the rostrum, is the longest. The two anterior feet are equal in size, the right one forming a forceps. This species is found during the whole year

in the markets at Nice. It is also found on the coast of the department of France, called the Bouches-du-Rhône(1).

Hymenocera, Latr.

The two anterior feet terminated by a long hook with a bifid extremity, and composed of very short divisions. The two following are very large; the hands, immovable finger, and superior thread of the intermediate antennæ are dilated, membranous, and almost foliaceous. The external foot-jaws are equally foliaceous, and cover the mouth.

The only species known is in the collection of the Museum d'Histoire Naturelle, and was captured in the Indian Ocean.

We now pass to subgenera, in which the claws present no remarkable or insulated peculiarity.

Sometimes the superior or intermediate antennæ are only terminated by two threads.

The rostrum is usually short.

Gnathophyllum, Latr.

The Gnathophylla are the only ones which approach the Hymenoceræ in the size of their foot-jaws. The four anterior feet form didactyle claws; the second pair is longer and thicker than the first. Neither of the segments of the four is annulated(2).

Pontonia, Latr.

The four anterior feet, as in the two following subgenera, didactyle claws, but the carpus is not annulated(3).

Alpheus, Fab.

The four anterior feet also terminated by a didactyle claw, but the carpus of the second is articulated. The latter are shorter than the former(4).

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(1) For the remaining species, see Risso, Hist. Nat. des Crust. de Nice; Leach, Malac. Brit., XLI; and the Nouv. Dict. d'Hist. Nat., Ed. II.

(2) *Alpheus elegans*, Risso, Crust., II, 4; Desmar., Consid., p. 228.

(3) *Alpheus thyrenus*, Risso, Crust., II, 2; *Astacus thyrenus*, Petag., V, 5; Desmar., Ib., p. 229.

(4) *Alpheus malabaricus*, Fab., and probably some other species, with which, however, I am not sufficiently acquainted. See Desmar., Consid., p. 222, 223.

HYPPOLYTE, Leach.

The Hyppolytes only differ from Alpheus in the respective proportion of their claws; the second are longer than the first(1).

The two last following subgenera have this peculiarity; but a single pair of their feet terminate in a didactyle claw. In the

AUTONOMEA, Risso,

It is the two anterior, which are also distinguished from the others by their size, their thickness, and their disproportion(2). In

PANDALUS, Leach,

The two anterior feet are simple, or hardly bifid; the two following ones are longer, of unequal length and didactyle, the carpus and preceding segment annulated.

The external foot-jaws are very long and slender, at least in some of them. The anterior projection of the shell is greatly extended, and multidentate(3).

Sometimes the superior antennæ have three threads.

They have four didactyle claws, the smallest of which are folded up, and an elongated rostrum.

PALÆMON, Fab.

Prawns are distinguished from the two following subgenera by their inarticulated carpus; the second feet are larger than the first; the latter are doubled up. A remarkably large species is found in the East Indies, the second claws of which are very long. Tolerably large ones are also found at the Antilles, some of which frequent the mouths of rivers. Those on the coast of France are much smaller, and are known there by the vulgar names of *Crevettes* and *Salicoques*. Their flesh is more highly esteemed than that of the Shrimp. According to M. de Brébisson—Catal. Method. des Crust. terrest. et fluviat., de depart. du Calvados,—they are taken in the same manner as the latter Crustacea, but in the summer only. Prawns swim well, particularly when escaping from pursuit, and in various directions. They are always found about the shore. The lithographic stone of

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(1) To this subgenus should be referred the *Palæmon diversimane*, and *P. marbré*, of Olivier. See Desmar., Consid., p. 220.

(2) *Autonomea Olivii*, Risso, Crust., p. 166; *Cancer glaber*, Oliv., Zool. Adriat., III, 4; Desmar., Consid., p. 251, and 252.

(3) *Pandalus annulicornis*, Leach, Malac. Brit., XL; *Pandalus narwal*, Latr.; *Astacus narwal*, Fab.; *Palæmon pristis*, Risso; *Cancer armiger?* Herbst., XXXIV, 4. See Desmar., Consid., p. 219, 220.

Pappenheim and Solhnofen, frequently exhibits the debris of a fossil crustaceous animal, referred by Desmarest to the Prawns, under the specific appellation of *spinipes*—Hist. Nat. des Crust. Foss. XI, 4. It does in fact resemble it, but the claws are wanting. A second fossil species, but much larger, has been discovered in England.

Pal. serratus, Leach, Malac. Brit. XLIII, 1, 10; Herbst., XXVII, 1, is from four to five inches long, of a pale red colour, which becomes more vivid on the antennæ, the posterior margin of the segments of the tail, and particularly on the terminal fin. The rostrum extends beyond the peduncle of the intermediate antennæ, is recurved at its extremity, and has five teeth above, exclusive of the point, and five beneath. The fingers are as long as the penultimate joint. It is found on the coast of France and England, and is the species of this subgenus that is more particularly sold at Paris. A sort of wen is frequently, and at all seasons, observed on one side of the shell, which covers a parasite Bopyrus, which fastens upon its branchiæ.

Pal. squilla, Leach, Malac. Brit., XLIII, 11—13; *Cancer squilla*, L.; *Squilla fusca*, Bast., Opusc. subs., lib. 2, 111, 5, is but half the size of the serratus. Its rostrum scarcely extends beyond the peduncle of the superior antennæ, is almost straight, or but slightly recurved, is emarginated at the extremity, and has seven or eight teeth above, and three below. The fingers of the claws are somewhat longer than the hand. Common on the coast of France and England(1).

The carpus is articulated, or presents annular divisions in the two following genera, viz.

SYSMATA, Risso: ante MELICERTA, ejusd.

Where the second pair of claws are larger than the first(2), and

ATHANAS, Leach,

In which, on the contrary, the first pair is larger than the second(3). The last subgenus of this section, that of

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(1) See the article *Palémon*, Encyclop. Méthod., and of the second edition of the Nouv. Dict. d'Hist. Nat., and Desmar., Consid., p. 236—238. See also in relation to the nervous system, the Mem. Cit., of Messrs Audouin and Milne Edwards.

(2) *Lysmata seticauda*, Risso, Crust., II, 1; Desmar., Consid., p. 238.

(3) *Athanas nitescens*, Leach, Malac. Brit., XLIV; Desmar., Consid., p. 239, 240; de Bréb., Crust. du Calv., p. 23, 24.

PASIPHÆA, Sav.,

Although closely approximated to several of the preceding by the superior antennæ which are terminated by two threads; by the form of the four anterior feet, terminating in a didactyle forceps, and preceded by a joint, without annular divisions, and by the shortness of the rostrum, differs from them in several respects. A testaceous appendage is very evident at the external base of their feet; these latter, with the exception of the claws, which are larger and nearly equal, are very slender and filiform; the body is greatly elongated, strongly compressed, and extremely soft.

> *Pas. sivado; Alpheus sivado*, Risso, Crust., III, 2; Desmar., Consid., p. 240, is two inches and a half long, and four lines and a half in breadth. The body is transparent, of a nacre white edged with red, the caudal fin marked with small dots of the same colour. The rostrum is sharp and slightly curved at the point. Claws reddish.
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> It is very abundant on the shores of Nice, and according to Risso spawns in June and July. No other species has yet been observed.

Our fifth and last section of the Macroura, that of the SCHIZOPODA, appears to connect the Macroura with the following order. The feet, none of which terminates in a forceps, are very slender, resemble thongs, are furnished with an appendage more or less long, arising from their external side near their base, and serving for natation only. The ova are situated between them, and not under the tail. The ocular pedicles are very short. As in most of the Macroura the front projects into a point or rostrum. The shell is thin, and the tail terminates, as usual, in a sort of fin. They are small, and inhabit salt water.

Here the eyes are very apparent; the lateral antennæ are accompanied by a scale, and the intermediaries terminated by two threads and composed of several small segments, as in the preceding genera.

MYSIS, Latr.

Antennæ and feet exposed; the shell elongated; nearly square or cylindrical; the eyes closely approximated, and the feet capillary, as if formed of two threads(1).

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(1) *Mysis Fabricii*, Leach; Encyc. Method., Atl., d'Hist. Nat., CCCXXXVI, 8, 9; *Cancer oculatus*, Oth.; Fab., Groenl., fig. 1. See Desmar., Consid., p. 241, 242.

Cryptopus, Latr.

A subovoid inflated shell, curving downwards on the sides, enveloping the body as well as the antennæ and feet, exhibiting beneath a mere longitudinal fissure. The eyes are separated, and the feet in the form of thongs, with a lateral appendage(1).

There the eyes are concealed; the intermediate antennæ are conical, inarticulated, and very short; the laterals are composed of a peduncle, and a thread without any distinct articulations. There is no—at least salient—scale at their base. Such is the

Mulcion, Latr.

The body is soft and thorax ovoid. The feet are in the form of a thong, and most of them have an appendage at their base; the fourth pair is the longest.

I know but one species, the *Mulcion Lesueurii*, which was captured by that zealous naturalist in the seas of North America. The late Olivier, in the Pinna marina, found a crustaceous animal very similar at the first coup d'œil to the *Lesueurii*, but the specimens were so much injured that it is impossible for me to study their characters.

The Nebaliæ, which we at first placed in this section, having no natatory appendages under the last segments of their body, and their feet being tolerably similar to those of a Cyclops, will pass with the Condylura into the order of the Branchiopoda, at the head of which they will stand. The Nebaliæ, by their very prominent eyes, which seem to be on pedicles, and by some other characters, appear to connect the Schizopoda with the Branchiopoda.

ORDER II.

STOMAPODA.

The branchiæ of the Stomapoda are exposed and attached to the five pairs of sub-abdominal appendages, exhibited to us by that part of the body, called tail, in the Decapoda, and which here, as in most of the Macroura, are fitted

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(1) *Cryptopus Defrancii*, Latr., from the Mediterranean.

for natation, or are fin-feet. Their shell is divided into two portions, the anterior of which supports the eyes and intermediate antennæ, or composes the head, without giving origin to the foot-jaws. These organs, as well as the four anterior feet, are frequently approximated to the mouth on two lines that converge inferiorly, and hence the denomination of Stomapoda affixed to this order. Judging by the Squillæ, the most remarkable genus of this order, and the only one hitherto studied, the heart is elongated, and similar to a large vessel. It extends along the whole length of the back, rests upon the liver and intestinal canal, and terminates posteriorly and near the anus, in a point. Its parietes are thin, transparent, and almost membranous. From its anterior extremity, placed immediately behind the stomach, arise three principal arteries, the mediate of which—the ophthalmic—giving off several branches on each side, is more particularly directed to the eyes and intermediate antennæ, and the two lateral ones—the antennaries—pass over the sides of the stomach and are lost in the muscles of the mouth and of the external antennæ. No artery arises from the superior surface of the heart, but a great many issue from its two sides, each pair of which, as it appears to us, corresponds to a particular segment of the body, commencing with the foot-jaws, whether these segments be external, or concealed by the shell, and even very small as is the case with those that are anterior. On a level with the first five abdominal annuli, or those to which the natatory appendages and the branchiæ are attached, this superior surface of the heart receives, near the median line, five pairs of vessels—a pair to each segment—proceeding from these latter organs, and which, according to Messrs Audouin and Milne Edwards, are analogous to the *branchio-cardiacs* of the Decapoda. A central canal (1) situated under

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(1) See our general observations on the Macroura. Neither this vessel nor the venous sinuses have been observed in the subsequent orders; but the heart preserves the same elongated form, and presents similar anterior arteries. From its sides also arise other arteries corresponding to the articulations of the body. In addition to the pre-cited Memoir, see the Leçons d'Anatomie Comparée of the Baron Cuvier.

the liver and intestine receives the venous blood which is poured into it from all parts of the body. On the level of each segment to which the foot-jaws and branchiæ are attached, it gives off a branch on each side, running to that part of the branchiæ which is situated at the base of the corresponding foot-jaw. The parietes of these vessels appear to the above mentioned gentlemen to be smooth and continuous, but formed by a layer of lamellated cellular tissue glued to the neighbouring muscles, rather than by a membrane proper; these vessels also appeared to them to communicate with each other near the lateral margin of the annuli, but they could not positively affirm it. The afferent or internal vessels of the branchiæ, which in these Squillæ form tufted bunches, are continuous with the branchio-cardiac canals, are no longer lodged in cells, pass between muscles, turn obliquely over the lateral part of the abdomen, reach the anterior margin of the preceding ring, and terminate on the superior surface of the heart near the median line, one partly mounting on the other. The medullary cord, exclusive of the brain, presents but ten ganglions, of which the anterior furnishes nerves to the mouth, the three following, those of the six natatory feet, and the last six, those of the tail. Thus, although the four last foot-jaws represent the four anterior feet of the Decapoda, they nevertheless form a part of the organs of manducation. The stomach of these Crustacea—Squillæ—is small and has but a few very small teeth(1) near the pylorus. It is followed by a straight and slender intestine which extends along the whole abdomen, accompanied on the right and left by glandular lobes which appear to supply the want of a liver. A ramous appendage adhering to the inner base of the last pair of feet appears to characterize the male.

The teguments of the Stomapoda are thin, and in several, nearly membranous or diaphanous. The shell is sometimes formed of two shields, of which the anterior corresponds to the head and the posterior to the thorax, and sometimes of

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(1) They form two ranges of transverse and parallel striæ.

a single piece, which however is free behind, usually exposing the thoracic segments, bearing the three last pairs of feet and having an articulation before that serves as a base to the eyes and intermediate antennæ; these latter organs are always extended and terminated by two or three threads. The eyes are always approximated. The formation of the mouth is essentially the same as in the Decapoda; but the palpi of the mandibles, instead of being laid on them, are always vertical. The foot-jaws are deprived of the flagelliform appendage presented to us by the same parts in the Decapoda. They have the form of claws or of small feet, and, at least in several—the Squillæ,—their external base as well as that of the two anterior feet properly so called, exhibits a vesicular body. Those of the second pair, in the same Stomapoda, are much larger than the others and even than the feet, which has caused them to be considered as true feet; fourteen of them have been counted(1). The four anterior feet have also the form of claws, but are terminated as well as the foot-jaws by a hook which curves towards the head, on the inferior and anterior edge of the preceding joint or of the hand. In others however—the Phyllosoma for instance(2)—all these organs are filiform and have no forceps. Some of them at least, as well as the last six and equally simple ones of the Stomapoda provided with claws, have an appendage or lateral branch. The seven last segments of the body, containing a large portion of the heart and furnishing a base for the attachment of the respiratory organs, can no longer in this respect be assimilated to that portion of the body which is called the *tail* in the Decapoda: it is a true abdomen. Its penultimate segment has a fin on each side formed like the caudal of the Macroura, but is frequently, as well as the last segment or intermediate portion, armed with spines or teeth.

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(1) The second jaws of these Stomapoda no longer present the same form as those of the Decapoda. They have the figure of an elongated triangle divided into four segments by transverse lines. The mandibles are bifurcated and well dentated.

(2) In all those where the four anterior feet are in the form of claws, the six last are natatory.

The Stomapoda are all marine Crustacea. Their favourite habitat is in the intertropical latitudes, and they are not found beyond the temperate zones. Of their habits we are totally ignorant; that those which are furnished with claws use them in seizing their prey, in the manner of those Orthoptera called in Provence *Pregadious* or *Mantes*(1), we cannot doubt. Hence their vulgar appellation of *Sea-Mantis:* they are the *Crangones* and *Crangines* of the Greeks. According to Risso they prefer sandy bottoms in deep water, and copulate in the spring. Other Stomapoda, those of our second family, being less favoured with natatory appendages and having a much flatter and more superficially extended body, are generally found on the surface of the water, where they move very slowly. We will divide the Stomapoda into two families.

FAMILY I.

UNIPELTATA.

In this family the shell consists of a single shield, of an elongated quadrilateral form, usually widened and free behind, covering the head, the antennæ and eyes excepted which are placed on a common anterior articulation, and at least the first segments of the body. Its anterior extremity terminates in a point or is preceded by a small plate with a similar end. All the foot-jaws, the second of which are very large, and the four anterior feet are closely approximated to the mouth on two inferiorly converging lines, and have the form of claws with a single finger or mobile and flexed hook. With the exception of the second feet all these organs are furnished at their external origin with a little pediculated vesicle. The other six feet, at the base of whose third segment is a lateral appendage, are linear, terminated by a brush, and simply natatory. The lateral antennæ have a scale at their base, and the stem of the intermediaries is composed of three filaments. The body is narrow and elongated; the ocular pedicles are always short.

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(1) Some other analogous Orthoptera, such as the *Phyllium*, resemble leaves. The Phyllosomæ, Crustacea of the same order, exhibit similar affinities.

This family is composed of but one genus, that of

SQUILLA, Fab.,

Which we will divide in the following manner:

In some the crustaceous shield is preceded by a small and more or less triangular plate, situated above the segment in which the eyes and mediate antennæ are inserted, only covers the anterior portion of the thorax, and does not curve downwards on the sides. The piece which serves as a peduncle to the mediate antennæ, as well as the ocular pedicles and the external sides of the end of the abdomen, are exposed.

Here the body is almost semi-cylindrical, the posterior edge of the last segment being rounded, dentated or spinous; the lateral appendages of the last six feet are styliform.

X SQUILLA, Lat.

The true Squillæ, along the whole inner side of the penultimate segment of the two large claws, have an extremely narrow groove, dentated on one of its edges and spinous on the other, and the ensuing joint or the claw, falciform and usually dentated.

Squilla mantis; Cancer mantis, L.; Herbst., XXXIII, 1; Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXIV; Desmar., Consid., XLI, 2, is about seven inches in length. The base of the large forceps is furnished with three movable spines, and its claws have six elongated and sharp-edged teeth, the last one being the largest. The segments of the body, the last one excepted, are marked by six longitudinal ridges, mostly terminating in a sharp point; the middle of the last is strongly carinated, punctured and terminated posteriorly by a double range of indentations, and four very stout points, the mediate teeth of which are most closely approximated; each lateral margin has two reflected or thicker divisions, the last one terminating in a point. The peduncle of the lateral fins is prolonged beneath and terminated by two very strong teeth. It is common in the Mediterranean. The *Squille de Desmarest*, Risso, Crust. II, 8, which also inhabits the same sea, is but two inches and a half in length. Its claws have five teeth; the shell and the middle portion of the abdominal segments, the last ones excepted, are smooth(1). In the

Gonodactylus, Lat.,

The groove of the penultimate segment of the large claws is widened at its extremity, presenting neither dentations nor spines. The finger is dilated, or resembles a knot near its base, terminating in a straight or slightly curved compressed point. They are all foreign to Europe(2).

There, the body is extremely narrow and depressed, and the last segment almost square, entire, and without dentations or spines. The lateral appendage of its last six feet is in the form of an almost orbicular and slightly bordered palette; the antennæ and feet are shorter than in the preceding; the penultimate segment of the large claws has its inner margin fringed with numerous cilia in the form of little spines; the finger is falciform.

Coronis, Latr.

But a single species is known(3).

In the remaining Stomapoda of this family the shell is almost membranous and diaphanous, covers the whole thorax, is curved laterally beneath, prolonged anteriorly into a spine or ensiform blade, and projects above the base of the mediate antennæ and of the eyes. This base or support is susceptible of being curved under and enclosed in the case formed by the curvature of the shield. The posterior fins are concealed under the last segment.

These very small, soft Crustacea are peculiar to the Atlantic Ocean and the Eastern seas. The fingers of the large claws have no teeth; the second joint of the ocular pedicles is much larger than the first, and has the figure of a reversed cone; the eyes properly so called are large and almost globular; the fin-like appendage of the feet resembles that of the Squillæ and Gonodactyli. In the

Erichthus, Latr.—*Smerdis*, Leach,

The first joint of the ocular pedicles is much shorter than the second; the middle of the lateral edges of the shield has a strongly angular dilatation, and their posterior extremity exhibits two teeth(1). In

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(1) For the other species, see the article Squille, and pl., of the Encyc. Méthod.; Desmar., Consid. In pl. XLII, he has given a detailed figure of the *Squille qieue-rude.*

(2) *Squilla scyllarus*, Fab.; Rumph., Mus., III, F;—*Squilla chiragra*, Fab.; Desmar. Consid., XLIII. See the article *Squille*, of the Encyclopedia Méthodique.

(3) See Encyclop. Méthod., art. Squille. *Squilla eusebia?* Risso.

Alima, Leach,

The first joint of the ocular pedicles is slender, cylindrical, and much longer than the following one; the body is narrower and more elongated than that of an Erichthus; the lateral borders of the shield are nearly straight or are but slightly dilated; there is a slight longitudinal carina on its middle, and each of its angles forms a spine, the two posterior of which are the largest(2).

FAMILY II.

BIPELTATA.

In this family we find the shell divided into two shields, the anterior of which, very large and more or less oval, forms the head, and the posterior, corresponding to the thorax, transverse and angular in its circumference, supports the foot-jaws and feet. These latter, with the exception at most of the two posterior and two last foot-jaws, are slender and filiform, usually very long and accompanied by a lateral, ciliated appendage. The other four foot-jaws are very small and conical. The base of the lateral antennæ exhibits no scale; the intermediaries are terminated by two threads. The ocular pedicles are long. The body is much flattened, membranous, and diaphanous; the abdomen small and its posterior fin without spines. It comprises but a single genus, the

Phyllosoma, Leach,

Of which all the species inhabit the Atlantic Ocean and Oriental seas(3).

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(1) *Erichthus vitreus*, Lat. See art. *Squille*, Atl. d'Hist. Nat. of the Encyclop. Méthod., pl. cccliv; and Desmar. Consid., XLIV, 2, 3.

(2) *Alima hyalina*, Lat., Encyclop. Méthod., art. *Squille*, and Ibid. Atl. d'Hist. Nat., CCCLIV, 8; Desmar., Consid., XLIV, 1.

(3) See Encyclop. Méthod., and Nouv. Dict. d'Hist. Nat., Ed. II, article *Phyllosome;* also the work of Desmarest on the Crustacea and the Zoology of the Voy. de Freycinet. As respects their nervous system, the Phyllosomæ seem to be intermediate between the preceding and subsequent Crustacea. See Audouin and Edwards, op. cit.

MALACOSTRACA.

b. Eyes sessile and immovable.

The Branchiopoda are the only Crustacea of which we shall henceforward have occasion to speak, that exhibit eyes placed on pedicles. But independently of the fact that these pedicles are neither articulated nor lodged in special cavities, the Branchiopoda have no shell and are otherwise removed from the preceding Crustacea by various characters. All the Malacostraca of this division are also deprived of a shell; their body, from the head downwards, is composed of a suite of articulations of which each of the first seven is furnished with a pair of feet, the following and last ones, seven at most, forming a sort of tail terminated by fins or styliform appendages. The head presents four antennæ, the two intermediate superior, two eyes, and a mouth composed of two mandibles, a tongue, two pairs of jaws, and a sort of lip formed by two foot-jaws that correspond to the two superior ones of the Decapoda; here, as in the Stomapoda, the flagrum no longer exists. The four last foot-jaws are transformed into feet, sometimes simple and at others constituting a claw, but almost always with a single toe or hook.

According to the observations of Messrs Audouin and Edwards, the two ganglionary cords of the spinal marrow are perfectly symmetrical and distinct throughout the whole of their length, and from those of the Baron Cuvier it would appear that the Onisci are only removed from them because these cords do not present the same uniformity in all the segments of the body, and because there are some ganglions less(1). Thus, according to them, the nervous system of the Crustacea is the simplest of all; in the Cymothoæ and Idoteæ the two ganglionary chains are no longer distinct, and those ganglions which immediately follow the two cephalics, form as many small circular masses situated on the median line of the body; but the cords of communication which serve to connect them, remain isolated and attached to each other. It would appear from these facts that the latter Crustacea are higher in the animal scale than the preceding ones, but other considerations seem to us to require a considerable separation between the Talitri and Onisci, and the arrangement of the Cymothoæ and Idoteæ in an intermediate rank.

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(1) See Oniscus.

The organs of generation are situated inferiorly near the origin of the tail. The two first appendages with which it is furnished beneath, and which are analogous to those presented to us by the same part in the preceding Crustacea, but more diversified, and always, as it appears, supporting the branchiæ, differ in this respect, according to the sex. The coitus takes place like that of insects, the male placing himself on the back of his female; the latter carries her ova under the thorax, between scales which form a sort of pouch. There they are developed, and the young remain attached to the feet or other parts of the body of their mother, until they have acquired the strength requisite for natation, and providing for their wants. All these Crustacea are small, and mostly inhabit the sea-coast or fresh water. Some are terrestrial, and others are known which are parasitical.

They are divided into three orders: those whose mandibles are furnished with a palpus, appear to be naturally connected with the preceding Crustacea—such are the Amphipoda; those in which these organs are deprived of them will constitute the two following orders—the Læmodipoda and the Isopoda. The Cyami, a genus of the second one, being parasitical, naturally lead us to the Bopyri and Cymothoæ, with which we commence the Isopoda.

ORDER III.

AMPHIPODA.

The Amphipoda are the only Malacostraca with sessile and immovable eyes, whose mandibles, like those of the preceding Crustacea, are furnished with a palpus, and the only ones whose subcaudal appendages, always very apparent, by their narrow and elongated form, their articulations, bifurcations, and other incisures, as well as by the hairs or cilia with which they are provided, resemble false or natatory feet. In the Malacostraca of the following orders, these appendages have the form of laminæ or scales; here these hairs and cilia appear to constitute the branchiæ. Many of them, like the Stomapoda and the Læmodipoda, have vesicular bursæ either between their feet or at their external base, the use of which is unknown.

The first pair of feet, or that which corresponds to the second foot-jaws, is always annexed to a particular segment, the first after the head. The antennæ, which, with a single exception—the Phronimæ,—are four in number, project, gradually taper into a point, and consist, as in the preceding Crustacea, of a peduncle and a single stem, or one furnished at most with a little lateral branch, and usually composed of several joints. The body is generally compressed and curved beneath posteriorly. The terminal appendages of the tail are most frequently styliform and articulated. Most of them swim and leap with facility and always laterally. Some inhabit springs and rivulets, and are often found in couples consisting of the two sexes; most of them however live in salt water. Their colour is uniform, verging on reddish or greenish.

They may all be comprised in a single genus, that of

GAMMARUS, Fab.,

Which we may subdivide, in the first place, into three sections, from the form and number of the feet.

1. Those which have fourteen feet all terminated by a hook, or in a point.

2. Those which also have fourteen feet, but which are—the four last at least—simply natatory.

3. Those which have only ten apparent feet.

The first section is divided into two.

Some of them,—the UROPTERA, Latr., usually have a large head; the antennæ are frequently short, and in some but two in number; the body is soft. All the feet, the fifth pair at most excepted, are simple, the anterior are short or small, and the tail is either furnished at the extremity with lateral fins, or is terminated by points or appendages, widened and bidentated, or forked at their posterior extremity. They inhabit the bodies of various Acephala or Linnæan Medusæ, and of some other Zoophytes.

Here, as in

PHRONIMA, Lat.,

There are but two—very short and biarticulated—antennæ; the fifth pair of feet is the largest of all and terminates in a didactyle forceps; the six appendages of the extremity of the tail are styliform, elongated and forked or bidentated at the end; six vesicular sacs may be observed between the last feet. Several species appear to exist, but they have not been strictly and comparatively described.

> That which has been taken for our type is the *Cancer sedentarius*, Forsk., Faun. Arab., p. 95; Latr., Gener. Crust. et Insect. I, ii, 2, 3, which is found in the Mediterranean, and inhabits a membranous transparent body that has the figure of a cask, and which appears to proceed from the body of a species of Beroe.
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> The *Phronime sentinelle*, Risso, Crust., II, 3, inhabits the interior of Medusæ, constituting the genera Equorée and Géronie of Péron and Lesueur. Another species, according to Leach, has been observed on the coast of Zealand.

There we observe four antennæ; all the feet are simple; on each side of the extremity of the tail is a lamellated or foliaceous fin, the leaflets of which are acuminated or unidentated at the end.

HYPERIA, Lat.

The body thickest anteriorly; the greater portion of the head occupied by oblong eyes somewhat emarginated on the inner edge;

two of the antennæ, at least half as long as the body and terminated by a long setaceous stem composed of several small joints(1).

Phrosine, Risso.

Form of the body and that of the head similar to the Hyperiæ, but the antennæ, at most, the length of the latter, composed of but few and styliform joints, or terminated by a stem resembling an elongated cone(2).

Dactylocera, Lat.

The body not thickened anteriorly; the head moderate, depressed, nearly square; eyes small; four extremely short antennæ composed of but few joints, as in Phrosine, of various forms—the inferior being thin and styliform, and the superior terminated by a small concave plate on the inner side—resemble a spoon or forceps(3).

The others—Gammarinæ, Latr.—always have four antennæ; their body, invested with coriaceous and elastic tegments, is generally compressed and arcuated; the posterior extremity of the tail is deprived of fins; its appendages are styliform and cylindrical, or conical. At least two of their four anterior feet are usually terminated by a forceps.

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(1) *Cancer monoculoides*, Montag., Trans. Lin. Soc. XI, ii, 3;—*Hypérie de Lesueur*, Lat., Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXVIII, 17, 18; Desmar. Consid., p. 258.

N.B. Near the Hyperiæ should be placed the genus Themisto, Lat., carefully figured and described in the Mém. de la Soc. d'Hist. Nat., tome IV. As in the Hyperiæ, the eyes are very large and occupy the larger portion of the head; two of the antennæ (the inferior), all terminated by a multi-articulated stem tapering to a point, are evidently longer than the others. The part there called *lèvre inferieure*, is the ligula; those which appeared to form the third pair of jaws are the first of the foot-jaws, and, as in the Amphipoda and Isopoda, close the mouth inferiorly under the form of a lip. The four remaining foot-jaws are very short, directed forwards and laid upon the mouth in such a way that they seem to constitute a part of it, so that if we do not count them, or if we merely consider the following locomotive and much more apparent organs as feet, this animal, like the Hyperia and Phrosine, appears at the first glance to have but ten feet instead of fourteen. The third pair of foot-jaws is terminated by a small didactyle forceps. The same pair of feet, properly so called, is much longer than the others; its penultimate joint is greatly elongated, and is armed with a range of small spines forming a sort of comb. But a single species is known.

(2) *Phros. macrophthalma*, Risso, Journ. de Phys., Octob. 1822; Desmar., Ib., p. 259; *Cancer galba*, Montag., Trans., Lin. Soc., XI, ii, 2.

(3) *Phros. seminulata*, Risso, Ib.; Desmar., Ib. The stem of the inferior antennæ consists of two or three joints, while in Phrosine it is inarticulate. There also, the joints of the peduncles of the same antennæ are shorter.

The vesicular bursæ, in those where they have been observed—the Gammarinæ, Latr.—are situated at the exterior base of the feet, commencing with the second pair, and are accompanied by a small plate. The pectoral scales which enclose the ova are six in number.

Sometimes the four antennæ, although of different proportions in several, have a similar form and uses; the inferior have no resemblance to feet nor do they perform their functions.

A subgenus which we have established under the denomination of

IONE, Lat.,

Only, however, from a figure given by Montagu—*Oniscus thoracicus*, Trans. Lin. Soc., IX, III, 3, 4—exhibits very peculiar characters which separate it from all others of the same order. The body consists of about fifteen joints, but only distinguished by lateral tooth-like incisions. The four antennæ are very short; those that are external, being longer than the others, are the only ones visible when the animal is seen on its back. Each of the two first segments of the body of the female is provided with two elongated, fleshy, flattened cirri resembling oars. The feet are very short, concealed under the body and hooked. The six last segments are furnished with lateral, fleshy, elongated, fasciculated appendages, which are simple in the male and like oars in the female. At the posterior extremity of the body we also observe six simple, recurved appendages, two of which are larger than the others. The abdominal valves are very large, cover the whole inferior surface of the body, and form a sort of receptacle for the ova. This animal remains concealed under the shell of the *Calinassa subterranea*, on the side of which it forms a tumour. Montagu, having withdrawn one of these Crustacea from its domicil, kept it alive for several days. The female is always accompanied by the male, who fixes himself firmly to her abdominal appendages by means of his forceps. It is a rare animal which, in its habits, approaches the Bopyri(1).

All the ensuing Amphipoda have the segments of the body perfectly distinct, throughout their whole extent; in neither sex nor in any of the species do we find those long oar-like cirri observed in the first of the Iones.

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(1) See Ann. des Sc. Nat., Decemb. 1826, XLIX, 10, the male—11, the female.

In the latter, when it exists, the movable toe of the foot, terminated by a forceps, is formed of a single joint.

Of these last, there are some whose superior antennæ are much shorter than the inferior, and even than their peduncle; the stem of the latter is composed of numerous joints.

ORCHESTIA, Leach.

The second feet of the male terminated by a large forceps, the movable toe long and somewhat curved; those of the female by two toes. The third joint of the inferior antennæ is at most twice the length of that of the preceding ones(1).

TALIPRUS, Lat.

Neither of the feet forming a forceps. The third joint of the inferior antennæ more than twice the length of that of the preceding ones; the antennæ large and spinous(2).

In the following, the superior antennæ are never much shorter than the inferior.

Some of them, furnished with elongated setaceous antennæ terminated by a pluri-articulated stem, and without any remarkable forceps, approach the preceding in their superior antennæ, which are somewhat shorter than the inferior, and are removed from those that follow by the form of their head which is narrowed before into a kind of snout. Such is

ATYLUS, Leach(3).

All those which succeed have the superior antennæ as long as the inferior, or longer; their head is not elongated into a snout.

Here, as in the five following genera of Leach, the peduncle of the antennæ is formed of three joints(4).

Some, in their superior antennæ, present a character which is unique in this order—the internal extremity of the third joint of the peduncle is provided with a little articulated thread. It distinguishes the

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(1) *Oniscus gammarellus*; Pall., Spic. Zool., Fascic., IX, iv, 8; *Cancer gammarus littoreus*, Montag.; Desmar., Consid., p. 261, XLV, 3.

(2) *Oniscus locusta*, Pall., Spic. Zool., Fascic. IX, iv, 7; *Cancer gammarus saltator*, Montag.; Desmar., Consid., XLV, 11.

(3) *Atylus carinatus*, Leach, Zool. Misc., LXIX; Desmar., Consid., p. 262, XLV, 4; *Gammarus carinatus*, Fab.;—*G. nugax?* ejusd.; Phipps, Voy. to the North Pole, XII, 2?

(4) The third joint of the peduncle may be very small and thus become assimilated to the following, or those of the stem; this peduncle, as in the Dexamines, then appears to consist of but two joints. According to the system of Leach the stem is understood to form another but compound joint.

GAMMARUS, Lat.,

Where the four anterior feet have the form of small forceps, the movable toe folding beneath.

> The species best known and the type of this subgenus is the *Cancer pulex,* L.; *Squillu pulex,* De Geer, Insect., VII, xxxiii, 1, 2. It inhabits brooks, etc. The other species are marine(1).

The antennæ of the following, as in all the other Amphipoda, are simple or without appendages.

MELITA, Leach.

The second pair of feet, in the male, terminated by a large compressed forceps, the toe folding under its internal surface; the antennæ nearly equal in length; a small foliaceous appendage on each side of the posterior extremity of the body(2).

MÆRA, Leach.

The second feet in the males terminated as in the Melitæ, but the toe folds under the inferior edge of the forceps and is not concealed. The superior antennæ are longer than the inferior, and the foliaceous appendages of the posterior extremity of the body are wanting(3).

AMPHITHOE, Leach.

The four anterior feet nearly similar in both sexes; the penultimate article or hand proper, ovoid(4).

PHERUSA, Leach.

The Pherusæ only differ from the preceding subgenus in the hand of the forceps, which is filiform(5).

There, the peduncle of the antennæ is only composed of two joints, the third being so small as to be confounded with those of the stem, or forming that of the base; the superior are longer than the inferior. All the feet are simple, or without forceps. Such is

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(1) See Desmar., Consid., p. 265, 267.

(2) *Cancer palmatus,* Montag., Trans., Lin. Soc., VII, p. 69; Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXXVI, 31; Desmar., Consid., XLV, 7.

(3) *Cancer gammarus grosimanus,* Montag., Trans. Lin. Soc., IX, iv, 5; Desmar. Consid. p. 264.

(4) *Cancer rubricatus,* Montag., Trans. Lin. Soc., IX, p. 99; Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXXVI, 33; Desmar., Consid., XLV, 9;—*Oniscus cancellus,* Pall., Spic. Zool. Fascic., IX, iii, 18; *Gammarus cancellus,* Fab.

(5) *Pherusa fusicola,* Leach; Trans. Lin. Soc., XI, p. 360; Desmar., Consid., p. 268.

DEXAMINE, Leach(1).

In those, the movable toe of the two forceps is bi-articulated. The antennæ are of equal length.

LEUCOTHOE, Leach.

The antennæ short, their peduncle formed of two joints; the four anterior feet terminated in a stout forceps; toes of the two first bi-articulated; those of the second pair consisting of a single and long joint(2).

CERAPUS, Say.

Large antennæ, the peduncle consisting of three—the superior—or four—the inferior—joints; the two anterior feet small, with a uni-articulated toe; the two following terminating in a large triangular, smooth, dentated hand, with a bi-articulated finger.

> *Ceraphus tubularis*, Say, Journ. Acad. Nat. Sc. of Philad., I, iv, 7—11; Desmar., Consid., XLVI, 2. It inhabits a little cylindrical tube, and in this respect approaches the subsequent subgenus. Very common at Egg Harbour, New Jersey, among the Sertulariæ on which it appears to feed.

Finally, the inferior antennæ, sometimes much larger than the superior, their stem consisting at most of four joints, have the form of feet, and appear to serve, at least occasionally, as organs of prehension.

Here the second feet are terminated by a large forceps.

PODOCERUS, Leach.

Eyes very prominent(3).

JASSA, Leach.

Eyes not prominent(4).

There, neither of the feet is terminated by a large forceps.

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(1) *Cancer gammarus spinosus*, Montag., Trans. Lin. Soc., XI, p, 3; Desmar., Consid., XLV, 6.

(2) *Cancer articulosus*, Montag., Trans. Lin. Soc. VII, 6; Desmar., Consid., p. 263, XLV, 5.

(3) *Podocerus variegatus*, Leach, Trans. Lin. Soc., XI, p. 361; Desmar., Consid. p. 269.

(4) *Jassa pulchella*, Leach, Ib., p. 361; Desmar., Consid., p. 269.

COROPHIUM, Lat.

C. longicornis; *Cancer grossipes*, L.; *Gammarus longicornis*, Fab.; *Oniscus volutator*, Pall., Spic. Zool., Fascic. IX, iv, 9; Desmar., Consid., XLVI, 1, called *Pernys*, on the coast of Rochelle, lives in holes, which it forms in the mud, that is covered with hurdles, called *bouchots*, by the inhabitants. The animal does not make its appearance till the beginning of May. It wages everlasting war against the Nereides, Amphinomæ, Arenicolæ, and other marine Annelides, which inhabit the same locality. A curious spectacle is presented by these Crustacea, when the tide is coming in; myriads of them may then be seen moving in every direction, beating the mud with their great arms, and diluting it in order to discover their prey—is it one of the above mentioned Annelides they have discovered, which is ten or twenty times larger than themselves? they unite to attack and devour it. The carnage never ceases until the mud has been thoroughly turned up and its inequalities levelled. They do not even spare Molluscæ, Fishes, or dead bodies on the shore. They mount upon the hurdles which contain Muscles, and fishermen assert that they will cut the threads that keep them there, in order to precipitate them into the mud, where they may devour them at their leisure. They appear to breed during the whole summer, as females carrying their ova are to be met with at various periods. Waders and different Fishes prey upon them. For these interesting observations we are indebted to M. D'Orbigny, Senior, conservator of the Rochelle Museum and corresponding member of that of Paris(1).

The second section—HETEROPA, Lat.—is composed of those with fourteen feet, the last four of which, at least, are unarmed and destined for natation only. It comprises two subgenera(2).

PTERYGOCERA, Latr.

The thorax divided into several segments; four antennæ furnished with setæ or hairs in bunches; all the feet natatory and the last large and pinnated(1); cylindrical, articulated appendages to the posterior extremity of the body.

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(1) See Encyclop. Method., article *Podocère*.

(2) This and the following section, in the first edition of the Règne Animal, form the second of the Isopoda, that of the *Phytibranchiata*. But independently of our having discovered mandibular palpi in some of these Crustacea, the form of the subcaudal appendages appears to us to approximate them much nearer to the Amphipoda, than to the Isopoda. We may also observe that these animals, of which we have seen but very few, have not yet been well studied.

Apseudes, Leach.—*Eupheus*, Risso.

The thorax also divided into several segments, but the two anterior feet terminated by a didactyle forceps; the two following ones claviform, ending in a point and dentated on the edges; the next six slender and unguiculated at the extremity; the last four natatory. The antennæ are simple. The body is narrow, elongated, and has two long setaceous appendages at its posterior extremity(2).

The third and last section—Dekempedes, Lat.—is composed of Amphipoda, which present but six distinct feet.

Typhis, Risso.

But two very small antennæ, the head large and eyes not prominent; each pair of feet annexed to its peculiar segment, and the four anterior terminated by a didactyle forceps. On each side of the thorax are two movable plates, forming a sort of lids or valves, which when joined, the animal folding up its feet and tail beneath, enclose the body inferiorly and give it a spheroidal appearance. The posterior extremity of the tail has no appendage(3).

Anceus, Risso.—*Gnathia*, Leach.

The thorax divided into as many segments as there are pairs of feet, but all the latter simple and monodactyle; four setaceous antennæ; a stout square head with two large projections in the form of mandibles; extremity of the tail furnished with foliaceous fin-like appendages(4).

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(1) According to the figure of Slabber—*Oniscus arenarius*, Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXX, 3, 4,—the number of feet is but eight; reasoning from analogy, I presume it to be fourteen; besides, if the figure be exact, this genus would belong to the next section.

(2) *Eupheus ligioides*, Risso, Crust., III, 37; Desmar., Consid., 285;—*Apseudes talpa*, Leach;—*Cancer gammarus talpa*, Montag., Trans. Lin. Soc., IX, iv, 6; Desmar., Consid.; XLVI, 9. See the *Gammarus heteroclitus*, Viviani, Phosphor. Maris, II, ii, 12.

N.B. The genus Rhœa, M. Edwards, Ann. des Sc. Nat. XIII, xiii, A, 292, differs from the preceding in the superior antennæ, which are stouter, longer, and bifid.

(3) *Typhis ovoides*, Risso, Crust., II, 9; Desmar., Consid., p. 281, XLVI, 5.

(4) *Anceus forficularis*, Risso, Crust., II, 10; Desmar., Consid., XLVI, 6;—*Anceus maxillaris; Cancer maxillaris*, Montag., Trans. Lin. Soc., VII, vi, 2; Desmar. Ib., XLVI, 7.

PRANIZA, Leach.

Four setaceous antennæ, as in the preceding; but the thorax viewed from above presents but three segments, the two first of which are very short and transverse, each supporting a pair of feet, while the third, much larger and longitudinal, supports the others. The feet are simple; the head is triangular, pointed before, and has prominent eyes. Each side of the posterior extremity of the body is also provided with a fin(1).

Various genera of Messrs Savigny, Rafinesque and Say(2), but the characters of which have not been described or sufficiently developed, appear to belong to this order of the Amphipoda. Even some of the subgenera I have just quoted, require to be re-examined.

M. Milne Edwards has made several valuable and detailed observations on several of these Crustacea, which will most certainly tend to elucidate the subject.

ORDER IV.

LÆMODIPODA.

The Læmodipoda are the only Malacostraca with sessile eyes, in which the posterior extremity of the body exhibits no distinct branchiæ, and which are almost deprived of a tail, the two last feet being inserted in that extremity, or the segment which connects them with it being merely followed by one or two very small joints. They are also the only ones in which the two anterior feet, that correspond to the second foot-jaws, form part of the head.

They all have four setaceous antennæ supported by a triar-

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(1) *Oniscus cœruleatus*, Montag., Trans. Lin. Soc., XI, iv, 2; Encyclop. Méthod., Atl. d'Hist. Nat., CCCXXIX, 28, and CCCXXIX, 24, 25; Desmar. Consid., XLVI, 8.

(2) I can say nothing of the *G. ergine*, Risso: the number of its feet would seem to place it in the last section of the Amphipoda; while the manner in which they terminate, and the number of the segments of the body, appear to throw it among the Isopoda.

ticulated peduncle, mandibles, without palpi, a vesicular body at the base of at least the four pairs of feet, beginning at the second or third pair, those of the head included. The body, usually filiform or linear, is composed of eight or nine segments, including the head, and some small appendages in the form of tubercles at its posterior and inferior extremity. The feet are terminated by a stout hook. The four anterior, the second of which are the largest, are always terminated by a monodactyle forceps or a claw. In several, the four following ones are shortened, less articulated, without the terminal hook, or are rudimental, and nowise adapted for the ordinary uses of similar parts.

The females carry their ova under the second and third segments of the body in a pouch formed of approximated scales.

They are all marine Crustacea. M. Savigni considers them as allied to the Pycnogonides, and constituting with the latter the transition from the Crustacea to the Arachnides. In the first edition of this work they formed the first section of the Isopoda, that of the Cistibranchiata.

We may unite them in a single genus which, by the law of priority, should be called the

CYAMUS, Lat.

Some—the FILIFORMA, Lat.—have a long and very slender or linear body with longitudinal segments; feet equally slender and elongated, and the stem of the antennæ composed of several small joints.

They are found among marine plants, walk like the caterpillar termed the Geometra, sometimes rapidly revolving in a circle, or turning up their body, during which time the antennæ are vibrating. While swimming, the extremities of their body are curved.

LEPTOMERA, Lat.—*Proto*, Leach.

Fourteen feet, including the two annexed to the head, all complete and in a continuous series.

Here, as in our LEPTOMERA proper—*Gammarus pedatus*, Mull., Zool. Dan., CI, 1, 2—all the feet, the two anterior excepted, have a vesicular body at their base.

There, as in the PROTO, Leach—*Cancer pedatus*, Montag., Trans.

Lin. Soc., II, 6; Encyclop. Méthod., Atl. d'Hist. Nat. CCCXXXVI, 38—those appendages are only proper to the second, and four following feet(1).

NAUPREDIA, Lat.

But ten feet, all in one continuous series; the base of the second and two following pairs provided with a vesicular body(2).

CAPRELLA, Lam.

Ten feet also, but in an interrupted series, commencing with the second segment, exclusive of the head; both this segment and the following have two vesicular bodies, and are totally deprived of feet(3).

The other—OVALIA, Lat.—Læmodipoda have an oval body with transversal segments. The stem of the antennæ appears to be inarticulated, and the feet are short but slightly elongated; those of the second and third segments are imperfect and terminated by a long cylindrical joint without a hook; their base is provided with an elongated vesicular body. They form the subgenus

CYAMUS, Lat.—*Larunda*, Leach.

I have seen three species, all of which live on the Cetacea; the most common, *Oniscus ceti*, L.; Pall., Spicil. Zool. Fascic. IX, iv, 14; *Squille de la Baleine*, De Geer, Ins., VII, vi, 6; *Pycnogonum ceti*, Fab.; Savig., Mém. sur les anim. sans verteb., Fascic., I, v, 1, is also found on the Mackerel: it is called by fishermen *Pou de Baleine*. A second very analogous species was brought to France by the late Delalande from the Cape of Good Hope. The third, which is much smaller, establishes itself on the Cetacea of the Indian Ocean.

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(1) We should also refer to the Leptomeræ the *Squilla ventricosa*, Mull., Zool. Dan., LVI, 1—3; Herbst., XXXVI, ii:—the *Cancer linearis*, L., is perhaps a congener. He describes it as having six feet, but does not include the head.

(2) A subgenus founded on a species from the coast of France, which appears to me undescribed.

(3) The *Squilla lobata*, Mull., Zool. Dan., LVI, 4, 6; his *Gammarus quadrilobatus*, Ib., CXIV, 12; the *Oniscus scolopendroides*, Pall., Spic. Zool. Fascic., IX, iv, 15, are Caprellæ, but their specific differences are not well characterized. We had referred the *Cancer linearis*, L., to the first, which, (see note one) now appears doubtful. His *Cancer filiformis* is probably a Caprella; the *Cancer phasma*, Montag., Trans. Lin. Soc., VII, vi, 2, is a congener. His figure is copied Encyc. Méthod., Atl. d'Hist. Nat., CCCXXXVI, 37. For details concerning this order and genus, see the Nouv. Dict. d'Hist. Nat., Ed. II, and the work of Desmarest on the Crustacea.

ORDER V.

ISOPODA(1).

The Isopoda approach the Læmodipoda by the palpi of the mandibles being absent, but are removed from them in several other respects. The two anterior feet are not attached to the head, and belong, as well as the following ones, to a particular segment. They are always fourteen in number, unguiculated, and without any vesicular appendage at their base. The under part of the tail is furnished with very apparent appendages resembling leaflets or vesicular bursæ, the two first or external of which, either partially or wholly, usually cover the others. The body is generally flattened, or is wider than it is thick. The mouth consists of the same pieces as in the preceding Crustacea; but here, those which correspond to the two superior foot-jaws of the Decapoda, exhibit an appearance of a lower lip terminated by two palpi, still more than in the latter. The two mediate antennæ are almost obliterated in the last Crustacea of this order, which are all terrestrial and also differ from the others in their respiratory apparatus. The male organs of generation are usually announced by linear or filiform appendages, and sometimes by hooks, situated at the internal origin of the first sub-caudal laminæ. The females carry their ova under the thorax, either between scales, or in a pouch or membranous sac, which they open in order to allow a passage to their young, which are produced with the form of parts peculiar to their species, merely changing their skin as they increase in size. Most of them are aquatic. Those which are terrestrial, like all other Crustacea which live out of water, still require a certain degree of atmospheric humidity to enable them to breathe, and to preserve their branchiæ in a proper state for the exercise of that function.

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(1) The Polygonata, Fab., with the exception of the genus Monoculus.

Messrs Audouin and Edwards—Ann. des Sc. Nat., Aout 1827, p. 379, 381—have published some interesting observations on the circulation of the Isopoda, and on that of the Ligiæ in particular. The heart resembles a long vessel extended above the dorsal surface of the intestine. From its anterior extremity arise three arteries, similar to those of the Decapoda. Lateral branches are also to be observed running from the heart towards the feet. On a level with the two first segments of the abdomen (the tail), that organ receives, from the right and left, small canals (branchio-cardiac vessels) which seem to proceed from the branchiæ. From their experiments on the Ligiæ, it would appear that the venous system is less complete than in the Decapoda macroura, and that the blood driven from the heart into various parts of the body, passes into lacunæ formed between the organs in the inferior part of the body which communicate freely with the afferent vessels of the branchiæ. The blood having traversed the respiratory apparatus, returns to the heart through the branchio-cardiac vessels. This disposition would form the transition from the circulating system of the Decapoda to that of certain Branchiopoda. According to Cuvier, the two anomalous cords which form the mediate portion of the nervous system of the Onisci—and, probably, of the other Isopoda and even of the Amphipoda—are not in complete juxtaposition, and may be distinguished throughout their whole course. There are nine ganglions without counting the brain, but the two first and two last are so closely approximated that we may reduce the number to seven. The second and six subsequent ones furnish nerves to the seven pairs of feet; the four anterior, although, by the order of the parts, analogous to the four last foot-jaws of the Decapoda, are true feet. The segments which immediately follow, or those which form the tail, receive their nerves from the last ganglion; these segments may be considered as simple divisions of one segment represented by this ganglion; thus we find that the number of these posterior segments varies.

This order according to the system of Linnæus embraces the genus

ONISCUS, Lin.,

Which we will divide into six sections.

The first—EPICARIDES, Latr.—is composed of parasitical Isopoda, with neither eyes nor antennæ, the body of which, in the male, is very flat, small and oblong; much larger in the female, and having an oval form narrowed and slightly curved posteriorly, hollow beneath, with a thoracic border divided on each side into five membranous lobes. The feet are placed on this border and cannot be used either for locomotion or natation. The under surface of the tail is provided with five pairs of small, ciliated, imbricated leaflets, corresponding to as many segments and arranged in two longitudinal series; there is no appendage, however, to the posterior extremity. The only parts distinctly visible in the mouth are two membranous leaflets laid upon another of the same nature, forming a large quadrilateral figure. The inferior concavity, forming a sort of shallow basket, is filled with the ova. Near their outlet is always found the individual presumed to be the male. Its extreme smallness seems to forbid all possibility of copulation; according to Desmarest it is provided with two eyes; its body is straight and almost linear.

These Crustacea form but a single subgenus, that of

Bopyrus, Lat.,

The most common species is the *Bopyrus crangorum*, Lat., Gener. Crust. et Insect., I, 114; *Monoculus crangorum*, Fab.; Fouger. de Bondar, Mém. de l'Acad. Roy. des Sc., 1772, pl. 1; Desmar., Consid. XLIX, 8—13. It lives on the Palæmon serratus, and the Pal. squilla, placed directly on the branchiæ and under the shell; it occasions a tumour on one of its sides, resembling a wen. The fishermen of the British channel consider them as very young Soles or Plaice.

A second species, the *B. des palémons*, has been described by Risso, under the female of which he observed eight or nine hundred living young ones(1).

The second section—Cymothoada, Lat.—comprises Isopoda with four very apparent setaceous antennæ, almost universally terminated by a pluri-articulated stem; having eyes, a mouth composed as usual(2); vesicular branchiæ arranged longitudinally and in pairs; the tail formed of from four to six segments, with a fin on each side near the end; and the anterior feet usually terminated by a small stout nail or claw. They are all parasitical.

The eyes are sometimes placed on tubercles on the top of the head; the tail consists of but four segments.

Serolis, Leach.

But a single species is known, the *Cymothoa paradoxa*, Fab. The antennæ are placed on two lines, and terminated by a pluri-articulated stem. Under the three first segments of the tail, between the usual appendages, there are three others, transversal and terminated posteriorly in a point(3).

Sometimes the eyes are lateral and not placed on tubercles; the tail is composed of five or six segments.

Here the organ of sight is not formed of smooth, granular, approximated eyes; the antennæ are placed on two lines, and consist of seven joints at least; the six anterior feet are usually terminated by a small, stout nail.

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(1) See the work of Desmarest, who has completely described this subgenus.

(2) See our general observations on the Malacostraca with sessile eyes.

(3) For other details consult Desmar., Consid., p. 292—294.

In some, where the tail always consists of six segments, the length of the inferior antennæ never surpassed the half of that of the body.

We will begin with those whose mandibles, as usual, are but slightly, or in no degree salient.

Cymothoa, Fab.

The antennæ nearly equal in length; eyes scarcely apparent; last segment of the tail forming a transverse square; the two pieces terminating the lateral fins, linear, equal and styliform(1).

Icthyophilus, Lat.—*Nerocila*, *Livoneca*, Leach.

The antennæ, equal in length, and but slightly visible eyes; the last segment of the body almost triangular; the two pieces terminating the lateral fins in the form of leaflets or laminæ, the exterior of which is largest in the Nerocilæ, and of the size of the other in Livoneca(2).

In the four following subgenera the superior antennæ are manifestly shorter than the inferior.

In several, as in Cymothoa, all the feet are terminated by a small, stout, and strongly curved nail; the last eight are not spinous; the eyes are always separated and convex. They form three genera in the system of Leach, but may be united in a single subgenus, under the common denomination of one of them, or the

Canolira, Leach.—*Anilocra*, *Olencira*, Ejusd.

The laminæ of the fins in the Olenciræ(3) are narrow and armed with spines. In the Anilocræ(4) the external leaflet of the same parts is longer than the internal; the reverse is the case with the Canoliræ(5). The eyes, besides, are but slightly granulous while in the preceding that disposition is evident.

In the three following subgenera, the second, third and fourth feet alone are terminated by a strongly curved nail, and the last eight are spinous. The eyes are usually but slightly convex; they are large and converge anteriorly.

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(1) *Cymothoa œstrum*, Fab.; Desmar., Consid., XLVI, 6, 7;—*C. imbricata*, Fab. For the other species, see Desmar., loc. cit.

(2) See Desmar., op. cit., p. 307, genera *Nerocila* and *Livoneca*, and various species of Cymothoæ of Risso, p. 310, 311.

(3) Desmar., Consid., p. 306.

(4) Desmar., Consid., *Anilocre du Cap*, XLVIII, 1.

(5) Desmar., Consid., p. 305.

ÆGA, Leach.

The two first joints of the superior antennæ very broad and compressed, while in the two subsequent subgenera they are almost cylindrical(1).

ROCINELA, Leach.

The Rocinelæ differ from the Ægæ, as just stated, in the form of the two first joints of their superior antennæ, but otherwise approach them, as in their large eyes which approximate anteriorly(2). The

CONILIRA, Leach,

Resembles Rocinela in the antennæ; but the eyes are smaller and distant, and the edges of the segments nearly straight and not falciform nor prominent(3).

The last subgenus, among those of this section in which the antennæ are placed on two lines, where the tail is composed of six segments, and the inferior antennæ are always short, is distinguished from all the preceding by strong and salient mandibles. It is the

SYNODUS, Lat.,

A subgenus established on a single species(4).

In those that follow, the tail is usually composed of but five segments. The length of the inferior antennæ is more than the half of that of the body.

CIROLANA, Leach.

The tail composed of six segments(5). In the

NELOCIRA, Leach,

It consists of but five. The cornea of the eyes is smooth(6).

EURYDICE, Leach.

Similar to Nelocira in the number of caudal segments, but removed from it by the granulous eyes(7).

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(1) Desmar., Consid., p. 304, *Æga entaillée*, XLVII, 4, 5.

(2) Desmar., Consid., p. 304.

(3) Desmar., Consid., p. 304.

(4) See Encyc. Method., article *Synodus*.

(5) Desmar., Consid., p. 303.

(6) Desmar., Consid., p. 302; *Nélocire de Swainson*, XLVIII, 2.

(7) Desmar., Consid., p. 302.

This subgenus leads us to those in which these organs are formed of granules or approximated simple eyes, and that also have the four antennæ, composed of four joints at most, inserted on one horizontal line, and all the feet fitted for walking. The tail consists of six segments, the last of which is large and suborbicular. Such is the

Limnoria, Leach.

The only living species known is the *Limnoria terebrans*, Leach, Edinb. Encyclop., VII, p. 433; Desmar., Consid., p. 312. Although scarcely above two lines in length, its habits and fecundity render it highly noxious. It perforates the timbers of ships in various directions and with alarming rapidity. When taken in the hand it rolls itself into a ball. It is found in various parts of the British seas.

The figure and description of a small fossil crustaceous animal has been sent to Count Dejean by Professor Germar, which seems to us to belong to this subgenus(1).

The third section—Sphæromides, Lat.—exhibits four very distinct, short, setaceous or conical antennæ, and a single genus—Anthura—excepted, always terminated by a stem divided into several small joints; the inferior, always the longest, are inserted beneath the under part of the first joint of the superior which is broad and thick. The arrangement of the mouth is as usual. The branchiæ are vesicular or soft, exposed, and arranged longitudinally in pairs. But two complete and movable segments are observed in the tail, the first, however, frequently presents impressed and transverse lines indicating vestiges of others; on each side of its posterior extremity is a fin terminated by two leaflets, of which the inferior alone is movable; the superior(2) is formed by an internal prolongation of the common stem. The branchial appendages are curved inwards; the inner side of the first are accompanied, in the male, by a small linear and elongated projection. The anterior part of the head situated beneath the antennæ is triangular, or has the figure of a heart reversed.

Some have an oval or oblong body, usually assuming, when contracted, the form of a ball; the antennæ terminated by a pluri-articulated stem, and the inferior, at least, visibly longer than the head.

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(1) The *Oniscus prægustator*, figured in Parkinson, is allied to this species, or at least appears to belong to the same section.

(2) It folds over the posterior edge of the last segment, and in several, such as the Zuzaræ, and Næsæ, Leach, like an arch.

The lateral and posterior fins are composed of a peduncle and two laminæ, forming with the last segment a common fin shaped like a fan.

In these, the impressed and transverse lines of the anterior segment of the tail, which is always shorter than the next or last one, do not extend to the lateral margin. The first joint of the superior antennæ has the form of a triangular palette.

The head, viewed from above, forms a transverse square. The leaflets of the fins are much flattened, and the intermediate piece or the last segment is widened and rounded laterally.

Zuzara, Leach.

Leaflets of the fins very large; the superior, which is the shortest, separates from the other to form a border to the last segment(1).

Sphæroma, Lat.

Leaflets of a moderate size, equal, and laid one over the other(2).

In those, the impressed lines or transverse sutures of the anterior segment of the tail extend to its lateral edges and cut it. The first joint of the superior antennæ forms an elongated square, or linear palette.

The leaflets of the fins are usually narrower and thicker than in the preceding; the external sometimes (Cymodocea) incloses the other, which is prismatic; the point at which they unite resembles a knot or joint.

Sometimes the sixth segment of the body is visibly longer throughout all its width than the preceding ones and that which follows.

Only one of the two leaflets projects.

Næsa,—*Campecopea*, Leach(3).

Sometimes the sixth segment of the body is as long as the preceding ones and as that which follows.

Cilicæa, Leach.

Only one of the fin-leaflets salient, the other being placed against the posterior edge of the last segment(4).

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(1) Desmar., Consid., p. 298.

(2) Desmar., Consid., p. 299—302. *Sphérome dentée*, XLVII, 3;—*Oniscus serratus*, Fab.

(3) Desmar., Consid., *Nesée bidenté*, XLVII, 2;—*Campecopée velue*, Id., It., 1.

(4) Desmar., Consid., *Cilicée de Latreille*, XLVIII, 3.

Cymodocea, Leach.

Both leaflets salient and directed backwards; the sixth segment is not prolonged posteriorly, and the extremity of the last one presents a small lamina in an emargination(1).

Dynamene, Leach.

Similar to the Cymodoceæ in the projection and direction of the leaflets of the fins, but the sixth segment is prolonged posteriorly, and the last one exhibits a mere fissure without the lamina(2).

The others, such as the

Anthura, Leach,

Have a vermiform body, and the antennæ, composed of four joints, scarcely as long as the head. The leaflets of the posterior fins by their disposition and approximation form a sort of capsule.

The anterior feet are terminated by a monodactyle forceps(3).

In the fourth section—Idoteides, Leach—there are also four antennæ, but they are placed on one horizontal and transverse line; the laterals terminate in a tapering, pointed, pluriarticulated stem; the intermediaries are short, filiform or slightly inflated at the end, and consist of four joints, neither of which is divided. The composition of the mouth is the same as in the preceding sections. The branchiæ, white in most of them, are in the form of bladders, susceptible of inflation, serving for natation and covered by two laminæ or valvulæ of the last segment that adhere laterally to its edges; they are longitudinal, biarticulated, and open in the middle on a straight line like folding doors. The tail consists of three segments, the last of which is much the largest, and has neither terminal appendages nor lateral fins. They are all marine.

Idotea, Fab.

All the feet alike, and strongly unguiculated; the body oval or simply oblong, and the lateral antennæ shorter than half the length of the body(4).

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(1) Desmar., Consid., XLVIII, 4.

(2) Desmar., Consid., p. 297.

(3) Desmar., Consid., *Anthure grêle*, XLVI, 13; *Oniscus gracilis*, Montag., Trans. Lin. Soc. IX, v, 6;—*Gammarus heteroclitus*, Vivian., Phosph. Mar., II, 11, 12.

(4) *Oniscus entomon*, L.; *Squilla entomon*, Deg., Insect., VII, xxxii, 1, 2;—*Idotea tricuspidata*, Latr.; Desm., Consid., XLVI, ii. For the other species, see Idotea, Nouv. Dict. d'Hist. Nat., Ed. II, and Desmar. op. cit.

STENOSOMA, Leach.

The Stenosomæ only differ from the Idoteæ in the linear form of their body, and the length of their antennæ which is more than half that of the body(1).

ARCTURUS, Lat.

The Arcturi are very remarkable for the form of the second and third feet, which incline forwards and terminate by a long, bearded and unarmed or feebly unguiculated joint; the two anterior are laid on the mouth and are unguiculated; the last six are strong, ambulatory, thrown behind, and bidentated at the extremity. In the length of the antennæ and form of the body they approach the Stenosomæ.

I have never seen but a single species, the *Arct. tuberculatus*, which was brought to Europe, from the Arctic seas, in one of the last expeditions to those regions.

The fifth section—ASELLOTA, Lat.—comprises Isopoda with four very apparent setaceous antennæ, arranged on two lines, and terminated by a pluriarticulated stem; two mandibles; four jaws covered, as usual, by a kind of lip formed by the first foot-jaws; vesicular branchiæ, in pairs, covered by two longitudinal and biarticulated, but free leaflets; a tail composed of a single segment, without lateral fins, but with two bifid stylets, or two very short tubercular appendages on the middle of its posterior edge. Other lamelliform appendages, situated at its inferior base, which are now numerous in the males, distinguish the sexes.

ASELLUS, Geoff.

Two bifid stylets at the posterior extremity of the body; eyes separated; the superior antennæ at least as long as the peduncle of the inferior; the hooks at the end of the feet entire.

The only species of this subgenus that is known—the *Aselle d'eau douce*, Geoff., Ins. II, xxii, 2; *Squille aselle*, Deg., Insect., VII, xxi, 1; Desmar., Consid., XLIX, 1, 2; *Idotea aquatica*, Fab.,—is very abundant in fresh and stagnant waters as well as in the marshes, in the vicinity of Paris. Its gait, unless alarmed, is very slow. In the spring it issues from the mud in which it has passed the winter. The male, much larger than the female, carries the latter for eight days, clasping her with the fourth pair of feet. When he abandons her she is loaded with a great number of ova inclosed in a membranous sac, situated under the thorax, which affords an issue to the young through a longitudinal fissure.

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(1) *Stenosoma lineare*, Leach; Desmar. op. cit. Ib. xlvi, 12;—*Stenosoma hecticum*, Ib.;—*Idotea viridissima*, Risso, Crust., III, 8. For the other species, see Desmar. op. cit.

ONISCODA, Lat.

The Oniscodæ or Janiræ(1) of Leach differ from the Aselli in the approximation of their eyes, in the superior antennæ which are shorter than the peduncle of the inferior, and in the hooks of the tarsi which are bifid.

The only species known, the *Janira maculosa*, Leach; Desmar., Consid., p. 315, was found on the coast of England among the Fuci and Ulvæ.

JÆRA, Leach,

But two tubercles at the extremity of the tail in place of the stylets.

But a single species has been described, the *gæra albifrons*, Leach; Desm., Consid., p. 316, which is very common on the English coast among the Fuci and Ulvæ.

Finally, the Isopoda of the sixth and last section—ONISOIDES, Lat.—have four antennæ also, but the two intermediate ones are very small, but slightly apparent, and are composed at most of but two joints; the lateral are setaceous. The tail consists of six segments, with two or four styliform appendages on the posterior margin of the last one, and is without lateral fins. Some of them are aquatic and others terrestrial. In the latter, the first leaflets of the under part of the tail exhibit a series of small holes, through which air penetrates to the organs of respiration therein contained.

In some, the sixth joint of their antennæ, or the stem, is so composed, that by counting the little joints of this part the total number amounts at least to nine. These Isopoda are marine and form two subgenera. The

TYLOS, Lat.,

Appears to possess the faculty of rolling itself into a ball. The

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(1) A name employed by Risso for a genus of the same class; I have consequently been obliged to replace it with another.

last segment of the body is semicircular, and exactly fills up the emargination formed by the preceding one; the posterior appendages are very small and entirely inferior. The antennæ consist of nine joints, the last four composing the stem. On each side is a depressed tubercle representing one of the intermediate antennæ; the intervening space is raised. The branchiæ are vesicular, imbricated, and covered by laminæ(1).

LIGIA, Fab.

The stem of the lateral antennæ composed of a great number of small joints; two very salient stylets divided at the end into two branches, at the posterior extremity of the body.

Ligia oceanica; *Oniscus oceanicus*, L., Desmar., Consid., XLIX, 3, 4, about an inch long, grey, with two large yellowish spots on the back. The lateral antennæ are less than half the length of the body, and their stem consists of thirteen joints. The stylets are as long as the tail. This animal is very common on the coast of France, where it is seen climbing up the rocks, &c. If an attempt be made to capture it, it quickly folds up its feet and lets itself fall.

In the *Ligia italica*, Fab., the lateral antennæ are nearly as long as the body; the sixth joint, or the stem, is divided into seventeen small ones. The stylets are much longer than the tail.

Ligia muscorum; *Oniscus hypnorum*, Fab., Cuv., Journ. d'Hist. Nat. II, xxvi, 3, 4, 5; *Oniscus agilis*, Panz., Faun., Ins. Germ., Fascic. IX, xxiv. The lateral antennæ shorter than the half of the body, and their stem composed of but ten small joints. The peduncle of the posterior stylets is furnished on the inner side with a tooth and seta.

In others, all terrestrial, the lateral antennæ consist at most of eight joints which gradually diminish in size towards the extremity, so that no one of them appears to be divided or compound.

Here, the posterior appendages, or stylets, project beyond the last segment. The body does not contract into a ball, or does it imperfectly.

PHILOSCIA, Lat.

The lateral antennæ divided into eight parts and exposed at base;

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(1) *Tylos armadillo*, Lat., fig. in the pl. d'Hist. Nat. of the great work on Egypt—from the Mediterranean.

the four posterior appendages nearly equal. They are only found in wet places(1).

Oniscus, Lin.

The true Onisci have also eight joints in their lateral antennæ, but their base is covered, and the two external appendages of the extremity of the tail are much larger than the others. These animals, and those of the two following subgenera are vulgarly called *Clous-à-porte*, and by syncope *Cloporte*, *Porcelets de Saint-Antoine*(2). They inhabit retired and obscure places, cellars, fissures in walls, old buildings, under stones, &c., &c. They feed on decaying vegetable and animal matters, and seldom issue from their retreat, except in rainy weather. They move but slowly, unless they are alarmed. The ova are inclosed in a pectoral pouch. The young, at birth, have one thoracic segment less than the adult, and consequently have but twelve feet. They are no longer employed in medicine(3).

Porcellio, Lat.

The Porcelliones differ from the Onisci in the number of joints that compose the lateral antennæ, which is only seven. In their other characters they are alike(4).

There, as in

Armadillo, Lat.

The posterior appendages of the body do not project; the last segment is triangular; a little lamina resembling a reversed triangle, or widest and truncated at the end, formed by the last part of the lateral appendages, fills, on each side, the space between that segment and the preceding one. The lateral antennæ have but seven joints. The superior subcaudal scales exhibit a range of small holes(1).

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(1) *Oniscus sylvestris*, Fab.; *Oniscus muscorum*, Cuv., Journ. d'Hist. Nat. II, xxvi, 6, 8; Coqueb., Ill. Icon. Insect., Dec. I, vi, 12.

(2) These "*Pigs of St Anthony*" are our *Wood-Lice*—Boiled in milk they still constitute a favourite remedy with numerous patients, and some few equally intelligent practitioners, who attribute to them diuretic, absorbent, and aperient qualities. That they may act as an emetic, I can readily admit. *Am. Ed.*

(3) *Oniscus murarius*, Fab.; Cuv., Journ. d'Hist. Nat., II, xxvi, 11, 13; *Le Cloporte ordinaire*, Geoff., Insect. II, xxii, 1; *Cloporte aselle*, Deg., Insect. VII, xxxv, 3; Desmar. Consid., XLIX, 5.

(4) *Oniscus asellus*, Cuv., Ib.; Panz., Faun. Ins. Germ., IX, xxi; *Cloporte ordinaire*, var. C, Geoff.;—*Porcellio lævis*, Latr.; *Cloporte ordinaire*, var. B, Geoff.

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(1) *Oniscus armadillo*, L.; Cuv., Ib., 14, 15; *Oniscus cinereus*, Panz., Ib., Fascic. LXII, xxii;—*Oniscus variegatus*, Vill., Entom., IV, xi, 16; *Armadille pustulé*, Desmar., Consid., XLXIX, 6;—*Armadille des boutiques*, Dumer., Dict. des Sc. Nat., III, p. 117, a species from Italy formerly employed by the apothecaries.

SECOND GENERAL DIVISION.

ENTOMOSTRACA.

Under this denomination, which is taken from the Greek and signifies *Insects with shells,* Othon Frederick Muller comprises the genus *Monoculus* of Linnæus, to which we must add some of his Lèrnææ. His investigation of these animals, the study of which is so much the more difficult as they are mostly microscopic, and the observations of Schæffer and of M. Jurine, Sen., have excited the admiration and secured the gratitude of every naturalist. Other but partial labours such as those of Randohr, Straus, Herman, Jun., Jurine, Jun., A. Brongniart, Victor Audouin, and Milne Edwards, have extended our knowledge of these animals and particularly of their anatomy; but in this respect, Straus, as well as M. Jurine, Sen., although preceded by Randohr in the observation of several important details of organization, of whose memoir on the Monoculi, 1805, they seem to have been ignorant, has surpassed them all. Fabricius merely adopted the genus Limulus of Muller, which he placed in his class of the Kleistagnatha, or our family Brachyura of the order Decapoda. All the other Entomostraca are united as by Linnæus in one single genus, Monoculus, which he places in his class of the Polygonata or our Isopoda.

These animals are all aquatic and mostly inhabit fresh water. Their feet, the number of which varies, and that sometimes extends to beyond a hundred, are usually fitted for natation only, being sometimes ramified or divided, and sometimes furnished with pinnulæ or formed of lamellæ. Their brain is formed of one or two globules. The heart has always the figure of a long vessel. The branchiæ, composed of hairs or setæ, singly or united, in the form of barbs, combs or tufts, constitute a part of those feet or of a certain number of them, and sometimes of the upper mandibles(1). Hence the origin of our term Branchiopoda, affixed to these animals, of which at first we formed but a single order. Nearly all of them are provided with a shell composed of one or two pieces, very thin, and most generally almost membranous and nearly diaphanous, or at least with a large anterior thoracic segment, frequently confounded with the head, which appears to replace the shell. The teguments are usually rather horny than calcareous, thereby approximating these animals to the Insecta and Arachnides. In those which are provided with ordinary jaws, the inferior or exterior are always exposed, all the foot-jaws performing the office of feet properly so called, and none of them being laid upon the mouth. The second jaws, those of the Phyllopa at most excepted, resemble these latter organs; Jurine sometimes distinguishes them by the name of hands.

These characters distinguish the gnawing Entomostraca from the Malacostraca; the others, those which constitute our order of the Pœcilopoda, cannot be confounded with the Malacostraca, inasmuch as they are deprived of organs of mastication, or because the parts which seem to act as jaws are not united anteriorly nor preceded by a labrum as in the antecedent Crustacea and the gnawing Insecta, but are simply formed by the branches of the locomotive organs, which, for that purpose, are furnished with small spines. The Pœcilopoda in this class of animals represent those which in that of Insects are known by the name of Suctoria or the Suckers. Nearly all of them are parasitical, and they seem to lead to the Lernææ by insensible gradations; but the presence of eyes, the faculty of changing their skin, or even of undergoing a sort of metamorphosis(2), and that of locomotion by means of their feet, appear to us to establish a positive line of demarcation between the former and the latter. We have consulted several erudite naturalists with respect to these transformations, but none of them have observed a change of skin to occur. The antennæ of the Entomostraca, whose form and number greatly vary, serve for natation in several. The eyes are rarely placed on a pedicle, and when this is the case, that pedicle is a mere lateral prolongation of the head, and is never articulated at base; they are frequently closely approximated and even form but one. The organs of generation are situated at the origin of the tail; it has been thought, but erroneously, that their seat was in the antennæ of the male. This tail(1) is never terminated by a fan-like fin, nor does it present those false feet observed in the Malacostraca. The ova are collected under the back, or are external, and covered by a common envelope, and resemble one or two small clusters at the base of the tail; it appears that they can be kept in a desiccated state for a long period without losing their properties.

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(1) See *Cypris*.

(2) The young of Daphnia, and of some neighbouring subgenera, and probably also those of Cypris and Cytherea, with the exception of size, scarcely differ, if at all, from their parents on quitting the egg; but those of Cyclops, the Phyllopa, and the Arguli, experience considerable changes while young, either as respects

It is only after a third change of skin that these animals become adult and capable of continuing their species. It has been proved, with respect to some of them, that a single copulation fecundifies several successive generations.

ORDER I.

BRANCHIOPODA.

A mouth composed of a labrum, two mandibles, a ligula, and one or two pairs of jaws, and branchiæ, the first of

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the form of the body or the number of feet. These organs in some, the Arguli for instance, experience changes which modify their uses.

(1) If we except the Phyllopa, the last feet are thoracic, or foot-jaws (*Cypris*).

which, when there are several, are always anterior, characterize this order or the sixth of the class.

These Crustacea are always wandering and are generally protected by a shell resembling that of a bivalve, and furnished with four or two antennæ. Their feet, with a few exceptions, are wholly natatory. Their number varies, being but six in some, while in others it amounts to twenty, forty-two, or more than a hundred. Many of them have but one eye.

Most of these animals, as we have already stated, being nearly microscopical, it is evident that the application of one of the characters we have employed—that of the presence or absence of the palpi of the mandibles—with respect to them, presents almost insuperable difficulties(1). The form and number of the feet, that of the eyes, the shell, the antennæ, furnish us with more visible marks, and such as are within the observation of every one.

This order in the systems of De Geer, Fabricius and Linnæus, a single species excepted—*M. polyphemus*, contained but the single genus

MONOCULUS, Lin.(2)

Which we will divide into two principal sections.

The first,—that of the LOPHYROPA—is distinguished by the number of feet, which never extends beyond ten; their joints are also more or less cylindrical or conical, and never entirely lamelliform or foliaceous; the branchiæ are but few in number, and most of them have but one eye. Several, besides, have mandibles provided with a palpus(3); there are, almost always, four antennæ which serve for locomotion.

In the second section—that of the PHYLLOPA—the number of feet is increased to at least twenty, and in some amounts to many more; their joints, or at least the last ones, are flattened and resemble ciliated leaflets. The palpi of the mandibles are always wanting. They all have two eyes, situated in some at the extremity of two movable pedicles; their antennæ, but two in number in several, are generally small and not fitted for natation.

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(1) We will begin, however, with those Branchiopoda whose mandibles are furnished with palpi: they constitute the two first divisions of the Lophyropa.

(2) And that of *Binocle* in the system of Geoffroi.

(3) M. Straus appears to attribute this character exclusively to Cypris and Cytherea, which compose his order of the Ostrapoda; but from the observations of Jurine, Sen., and Randohr, it seems that it also belongs to Cyclops.

We will divide the Lophyropa into three principal and very natural groups, the two first of which approach the Crustacea of our three first orders in their mandibles, each of which is furnished with a palpus, and in some other characters.

1. Those—Carcinoida, Lat.—whose more or less ovoid shell is not doubled like that of a bivalve, and leaves the inferior portion of the body exposed. They never have antennæ resembling ramified arms. They have ten feet, more or less cylindrical or setaceous. The ova, in those females whose gestation has been observed, are contained in two external sacs situated at the base of their tail. Some of them have eyes.

2. Those—Ostracoda, Lat.; Ostrapoda, Straus—whose shell is formed of two pieces or valves resembling those of a muscle, united by a hinge, and closing while the body is quiescent. They have but six feet(1), neither of which terminates in a digitated fin, nor is accompanied by a branchial lamina. Their antennæ are simple, filiform or setaceous. They never have more than one eye. Their mandibles and superior jaws are furnished with a branchial leaf. The ova are placed under the back.

3. The last—Cladocera, Lat.; Daphnides, Straus—have but one eye, and the shell doubled but without a hinge (Jurine), terminating posteriorly in a point, and leaving the head, which is covered by a kind of shield like a rostrum, exposed. They have two, usually very large, antennæ, resembling arms, divided into two or three branches directly above the peduncle, which are furnished with threads, always projecting and serving as oars. Their ten feet(2) are terminated by a digitated or pectinated fin accompanied, the two first excepted, by a branchial lamina(3).

Their ova are also placed under the back; their body always terminates posteriorly in the manner of a tail, with two or three threads at the end. The anterior extremity of the body is sometimes prolonged into a kind of rostrum, and at others forms a kind of head, almost entirely occupied by a large eye.

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(1) According to Straus, the first pair of feet; but although these parts by serving as oars perform their functions, I nevertheless consider them as analogous to the lateral antennæ of the superior Crustacea and to the two superior ones of a Cyclops, which here also concur with the feet in producing locomotion.

(2) Muller gives eight to the Cythereæ; reasoning from analogy, we may presume that he was mistaken.

(3) This character applies especially to Daphnia, the most numerous subgenus of this division, and by analogy, to Polyphemus and Lynceus.

The first division of the Lophyropa Branchiopoda—that of the Carcinoida—may be divided into two according to the number of the eyes.

Some of them have two.

Here the shell completely invests the thorax; the eyes are large and very distinct, and the intermediate antennæ are terminated by two threads.

ZOEA, Bosc.

Very large globular eyes completely exposed, and horn-like projections on the thorax.

Zoea pelagica, Bosc., Hist. Nat. Crust. II, xv, 3, 4. The body semi-diaphanous; four antennæ inserted under the eyes, the external ones bent into an elbow and bifid; a kind of long rostrum on the forepart of the thorax and between the eyes, and a long pointed prominence on the posterior part of the back. The feet are very short and hardly visible, the two last excepted, which are elongated or terminate in a fin. The tail is as long as the thorax, curved, and formed of five joints, the last being large, crescent-shaped and spinous. It was discovered by Bosc in the Atlantic Ocean.

The *Monoculus taurus*, Slabber, Microsc. V, and the *Cancer germanus*, L., appear to be allied to it(1).

NEBALIA, Leach.

Triangular, flattened eyes, partly covered by a triangular and arched scale.

The feet are forked, and the terminal appendages of the tail setaceous(2).

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(1) See the Hist. Nat. des Crust. et des Insect., of Latreille, and the work of Desmarest on the Crustacea. This genus has not yet been completely described, and we have not been able to procure a single specimen of it.

(2) *Nebalia Herbstii*, Leach, Zool. Miscell., XLV; Desmar., Consid., XL, 5; Rand., Monoc. I, 8?

The *Nébalie ventrue*, Risso, Journ. de Phys., Octob. 1822, probably forms a peculiar subgenus in the section of the Schizopoda. In the *Cyclops exiliens*, Viviani, the thorax is divided into several segments, a circumstance which excludes it from the Nebaliæ. It also forms a new subgenus intermediate between the preceding and following one.

N.B. A new species of this genus, the *N. Geoff. Saint-Hil.*, Ib., XV, 1, has been very minutely described by Milne Edwards. The head is terminated anteriorly by

There, the thorax or the shell, viewed from above, is divided into five segments, of which the first is much the largest and has the antennæ, eyes, and foot-jaws attached to it; the second and the third have each one pair of feet, the fourth has the two following pairs, and the fifth, the last. The eyes are small and not prominent; all the antennæ are terminated by a single thread.

CONDYLURA, Lat.

The inferior antennæ longest; the anterior sides of the first segment prolonged into a point forming two scales approximated into a kind of rostrum; feet terminating in a silky point; some of the intermediaries, as in the Schizopoda, with an external appendage near their base; the tail narrow and formed of seven annuli, the last of which, conical and elongated, projects between the two lateral appendages that are slender, styliform, and composed of two joints, the last silky(1).

We should remark, that the genus *Nicothoe* of MM. Audouin and Milne Edwards, by admitting it to have mandibles and jaws, would belong to this section; but as the animal on which it is founded is parasitical, and, as I think I perceived in it a vestige of a sucker, I have placed it among the Pœcilopoda. I would observe, however, that the feet, the anterior excepted, closely resemble those of Cyclops, and that the females also carry their ova in two sacs situated at the base of the tail as in the latter genus(2).

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a rostrum articulated at base, or movable and pointed; the eyes are pedunculated; the superior antennæ are inserted under them, and the second joint of their peduncle is furnished with a lamina; the mouth is surrounded with three pairs of appendages which appear to us to correspond in their progressive order to the palpigerous mandibles and four jaws of the Crustacea Decapoda; beneath are placed five pairs of foliaceous and ciliated laminæ which appear to be branchial, and further down are four pairs of bifid and natatory feet; the abdomen is composed of seven annuli, the first of which support two small rudimental filaments; the last is terminated by two elongated stylets furnished with long hairs. As it is extremely probable that there is, as usual, another pair of feet, the two inferior and branchial appendages above mentioned, may very well represent that pair. In the other appendages we should find foot-jaws and the parts of the ligula; in that case the Nebaliæ must be referred to the last section of the Decapoda Macroura.

(1) *Condylura Dorbigni*, Lat. From the sea coast of Rochelle.

(2) Near the Condyluræ should be placed the genus CUMA; M. Edwards, Ann. des Sc. Nat. XIII, xiii, B. The superior antennæ are rudimental, and consist of but one joint. The head is distinct from the thorax which is divided into four segments, to the first of which are attached the four anterior feet, each of the following having a pair; all these feet are natatory, directed forwards, and have no hook at the end; the two first pairs alone are bifid.

In the remaining Lophyropa of our first division, the thorax, as in the Condylura, is divided into several segments, the first of which is much the largest; they have but one eye situated in the centre of the front between the superior antennæ. Such is the

Cyclops, Mull.,

So well studied by Jurine, Sen., and Randohr. The body is more or less oval, soft or gelatinous, and divided into two portions, one anterior, composed of the head and thorax, the other posterior, or the tail. The segment immediately preceding the sexual organs, and which, in the female, is provided with two appendages in the form of little feet—*fulcra*, Jurine—may be considered as the first of the tail, which is not always decidedly or suddenly distinguished from the thorax. It is composed of six parts or segments; under the second in the males, are two articulated appendages, sometimes simple, and at others with a small branch on the inner side of various forms, and constituting, either wholly or partially, the organs of generation. The vulva, in the other sex, is situated on the same segment. The last one is terminated by two points or stylets, forming a fork, and is more or less furnished with setæ or penniform threads. The other or anterior portion of the body is divided into four segments, the first of which is much the largest, and composes the head and part of the thorax, which are also covered by a common scale. In it, are inserted the eye, four antennæ, two mandibles—mandibules internes of Jurine, furnished with a palpus, either simple or divided into two articulated branches, two jaws—mandibules externes, or lèvre avec des barbillons of Jurine(1), and four feet, each divided into four cylindrical stems furnished with hairs or bearded threads; the anterior pair, corresponding to the second jaws, differs slightly from those that follow. Jurine compares it to a kind of

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The genus Pontia, Id., Ib., XIV, appears to us to approach Cyclops. The head is distinct from the trunk, and terminated by a rostrum which is rather acute and appears to be formed of two pieces; it has two sessile eyes; four antennæ, the superior of which are setaceous, multi-articulated and ciliated; the inferior are pediform, composed of a peduncle, serving as a base to two divisions or branches, each terminated by a pencil of hairs, one of them having two joints, the last widened at the end, and the other consisting of one. The thorax is divided into five annuli, and has six pairs of natatory and bifid feet. The abdomen is formed of two segments and terminated by two spatula-like appendages or fins.

(1) According to the successive order of the parts of the mouth in the Decapoda, the part situated immediately beneath the mandibles is the ligula; but the dentation of those here spoken of indicates maxillary organs. The ligula may have escaped the notice of M. Jurine.

hands. To each of the three following segments, is attached a pair of feet formed like the two last of the preceding ones. Two of the antennæ, superior to the others, are longer, setaceous, simple, and composed of numerous small joints; by their action, they facilitate the motion of their body, and almost perform the office of feet. The inferior—antennales, Jurine—are filiform, usually present but four joints, are sometimes simple, and at others, forked; by the rapidity of their motions in the water, they occasion a kind of whirlpool. In the males, the superior antennæ, or one of them only (*C. castor*) are marked by a strangulation and dilatation, followed by a joint with a hinge. By means of these organs, they seize their females, in their amorous preludes, either by the posterior feet, or by the extremity of the tail, and keep them, nolens volens, in the peculiar position in which they fix themselves. The latter carry off the males, when they are unwilling to gratify their desires on the spot. The business of coition is performed, as in the preceding Crustacea, and by prompt and repeated acts. Jurine observed it to occur three times in the space of fifteen minutes. Until the publication of his remarks, it was thought that the male organs of generation were placed on the superior antennæ, and this error appeared to be the more probable, inasmuch as an analogous conformation was known to exist in the Araneides. On each side of the tail, in the female, is an oval sac, filled with eggs—ovaire externe, Jurine—adhering by a very slender pedicle to the second segment, close to its junction with the third, where the orifice of the oviduct is also visible. The pellicle, forming these sacs, is a mere continuation of that of the internal ovary. The number of ova they contain augments with age; they are at first brown or dark, afterwards become reddish, and when the young ones are about to be hatched, are almost transparent, but without increasing in size. If insulated or detached, at least until a certain period, the germ perishes. A single, but indispensable fecundification suffices for several successive generations. The same female may spawn ten times in the space of three months. Allowing it to occur but eight times in that period, and the number of young ones produced to be forty, the sum total of births will amount to near four thousand five hundred millions. The length of time which the young remain in the ovaries, varies from two to ten days, according to the temperature of the season, and various other circumstances. The oviferous sacs sometimes present a greater or less number of elongated glandiform bodies which appear to consist of a collection of Infusoria.

The young, at birth, have but four feet, and their body is rounded and without a tail. It was with these that Muller formed his genus *Amymone*. Some time after—fifteen days, from February to

March—they acquire another pair of feet, constituting the genus *Nauplius*, Muller. After the first change they have the form and all the parts which characterize the adult animal, but more exiguously proportioned; their antennæ and feet are proportionally shorter. After thrice changing their skin they are capable of propagation. Most of these Entomostraca swim on their back, dart about with great vivacity, and move both backwards and forwards with equal facility. For want of animal substances they will attack vegetable matters, but the fluid in which they live does not pass into their stomach. The alimentary canal extends from one extremity of the body to the other. The heart in the *C. castor* is oval, and situated under the second and third segment of the body; a vessel is given off at each of its extremities, one running to the head, and the other to the tail. Directly under it is a second analogous, but pyriform organ, which also produces a vessel at each end, corresponding perhaps to the branchio-cardiac canals, mentioned in our observations on the circulation of the Crustacea Decapoda. From several experiments made by Jurine upon various Cyclopes, alternately asphyxiated and resuscitated, it would appear that in this sort of resurrection the extremity of the intestinal canal gives the first signs of life, and that the irritability of the heart is less energetic; that of the antennæ, in the males especially, of the palpi, and lastly of the feet, is inferior. No alteration is effected in the antennæ by amputating a portion of them; the reintegration takes place under the skin, for the organs reappear in all their entireness at the ensuing moult.

The *C. staphylinus*, from its shorter antennæ, the superior of which consist of a considerably less number of joints than those of other Cyclopes, while the inferior, on the contrary, have more; and from the shape of its body which gradually diminishes towards its posterior extremity, so that it seems to have no tail or at least none that is abruptly formed, and its back, in the females, being armed with a kind of horn posteriorly arcuated, forms a particular division. The *C. castor*, and some others whose inferior antennæ and mandibular palpi are divided above their base into two branches, may also compose another group. The one designated by Leach under the generic name of *Calanus*, might in fact constitute a separate subgenus, if it were true that the animal on which it is founded had no inferior antennæ; but has that gentleman satisfied himself that such is the fact, by personal observation, or does he depend upon the assertion of Muller?

> *C. quadricornis; Monoculus quadricornis*, L.; Mull., Entom., XVIII, 1—14; Jurine, Monoc., I, II, III. All the antennæ simple or undivided; the inferior with four joints, and their length

hardly equal to one-third of the others; the body, properly so called, inflated and almost ovoid; tail narrow and formed of six segments. The colour varies greatly; some are reddish, others whitish or greenish. The whole length of the animal is two lines. This species is very common(1).

The second general division of the Lophyropa Branchiopoda, or that in which the shell is formed of two valves united by a hinge—OSTRACODA, Lat.; *Ostrapoda*, Straus—is composed of two subgenera, the first of which, Cythere, since the interesting and valuable observations of the latter upon the second or Cypris, appears to solicit a more profound examination than that of Müller, our only authority with respect to its characters, in order that they may be clearly defined. According to Müller we find in the

CYTHERE, Müll.—*Cytherina*, Lam.

Eight simple feet(2), terminating in a point, and two equally simple, setaceous antennæ, composed of five or six joints, furnished with scattered hairs. They are found in the salt and brackish waters of the sea-coast among the Fuci and Confervæ(3).

CYPRIS, Müll.

But six feet(4); the two antennæ terminated by a bundle of setæ resembling a pencil.

The shell forms an oval, laterally compressed body, with an arcuated and convex back, or towards the hinge; the opposite side is almost straight, and slightly emarginated or reniform. Before the hinge and on the median line is the eye, forming a large, blackish, round point. The intermediate antennæ, inserted above, are shorter

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(1) Desmar., Consid., p. 364. For the other species, see the same work, p. 361—364, LIV; Mull., Entom., CYCLOPS; Jurine, Hist. des Monoc., p. 1—84, prem. fam. des Monoc. à coquille univalve; Rand., Monoc., I, II, III.

(2) It is probable there are but six. See Cypris, note 4.

(3) If these Entomostraca inhabit salt-water exclusively, it is easy to see that Jurine and other observers whose geographical position limited their researches to the fresh-water genera, could not have spoken of the former. See Mull., Entom., CYTHERE, and Desmar., Consid., p. 387, 388, LV, 8.

(4) Four according to Randohr, and eight according to Jurine; the first considering the two last as appendages of the males, and the second looking upon the palpi of the mandibles and the branchial laminæ of each upper jaw—the two first feet of his second division of the body, those which he says are composed of but one joint and terminated in a dentated spoon—as so many feet. The latter does not include in this number those which the former considers as sexual organs; he states them—p. 161, 166—to be five jointed threads issuing laterally from the pouch of the matrix, of the use of which he is ignorant.

than the body, setaceous, composed of from seven to eight joints, the last of which are shortest and terminated by a bundle of twelve or fifteen setæ, serving as fins. The mouth consists of a carinated labrum, two large dentated mandibles, each furnished with a tri-articulated palpus, to the first segment of which adheres a small branchial leaf with five digitations(1), and of two pairs of jaws. The two superior are much the largest, and have four movable and silky appendages on their internal margin, and a large, pectinated, branchial lamina on their anterior edge; the second are composed of two joints, with a short, nearly conical, inarticulated palpus(2) silky at the end, as is the extremity of the jaws themselves. A sort of compressed sternum fulfils the functions of a lower lip(3). The feet are divided into five joints, the third representing the femur, and the last the tarsus. The two anterior feet, inserted under the antennæ, are much shorter than the others, incline forwards, and are furnished with rigid setæ, or long hooks united in a bundle at the extremity of the last joints. They are deficient in the four following feet. The second, situated in the middle of the under part of the body and at first directed backwards, are arcuated and terminated by a long and strong hook inclining forwards. The two last are never visible externally, but are turned up, applied to the posterior sides of the body in order to support the ovaries, and terminate in two very small hooks(4). The body presents no distinct articulation, and terminates posteriorly in a kind of soft tail which is doubled underneath, with two conical or setaceous threads furnished with three setæ or hooks at the end, directed backwards and issuing from the shell. The ovaries constitute two large, simple and conical vessels forming a cul-de-sac at their origin, and situated on the posterior sides of the body, underneath the shell, and opening, side by side, in the anterior portion of the abdomen where the canal formed by the tail establishes a communication between them. The ova are spherical. These Crustacea spawn, and change their skin, as frequently as the Cyclopes and other Entomostraca, and their mode of life is the same. Ledermuller states, that he observed them in coitu. Modern naturalists, who have most closely studied them, however, have never been able to discover their sexual organs with certainty, nor been fortunate enough to see them in actu. M. Straus observed, under the origin of the mandibles, the insertion of a stout conical vessel filled with a gelatinous substance, which appeared to communicate with the œsophagus by a straight canal, that he suspects may be a testis or salivary gland. The individuals which were the subjects of these observations having ovaries, the Cyprides according to the first supposition must be hermaphrodites. This is so much the more doubtful, however, as he himself remarks that it is possible the males may only exist at a particular season of the year, and that the vessel alluded to seems to be more nearly connected with the function of digestion than with that of generation(1).

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(1) Interior lip, Randohr.

(2) Forked in the *Cypris strigata*, Id.

(3) Exterior lip, Id.

(4) In the figure given by Randohr these feet consist of but three joints, and the last is somewhat dilated and emarginated at the end, with a hook in the middle of the emargination.

According to Jurine, the antennæ are true fins, the threads of which are spread out or united at the will of the animal, and in proportion to the degree of velocity it wishes to communicate to its motions; sometimes but a single one is visible, at others they are all displayed. We also think that these threads, and those of the two anterior feet, may be considered as aiding in respiration, quite as much as the laminæ of the mandibles, and of the two superior jaws, which M. Straus distinguishes by the name of branchial. The last, or those of the jaws, appear to me to be true but greatly dilated palpi, and the two others are appendages of the mandibular palpi. See Jurine, Hist. des Mon. VI, 3.

According to the naturalist of Geneva before mentioned, these animals, while they are swimming, move their anterior feet as rapidly as their antennæ, but very slowly when walking over the surface of aquatic plants. These feet, conjointly with the two terminated by a long hook, or the penultimates, then support the body. He supposes that those which, according to him, form the second pair, are destined to create an aqueous current and to direct it toward the mouth, thereby assimilating their functions to those of the second inferior antennæ, which he calls antennulæ. The two threads composing the tail unite on leaving the shell, and seem to form but one; they serve, as he supposes, to brush out its interior. The female deposits her ova in mass, fixing them on plants or the mud by means of gluten. During this operation, which lasts about twelve hours, and in the largest species produces twenty-four eggs, she clings with her second feet, and in such a manner as not to fear the shock of the water. He collected some of these packets of newly laid eggs, and after separating them, observed the hatching of the young ones, and obtained a second generation without the intervention of the males. A female which had deposited her ova on the 12th of April, changed her skin six times between that period and the 18th of the following May. On the 27th of the same month she spawned a second time, and two days afterwards, on the 29th, a third. From this, he concludes that the number of these changes in the young animal is in proportion to the gradual development of the individual; that this development can only take place by the general separation of an envelope become too small to contain the animal; and that the size of the latter has a determined limit to which it must attain(1).

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(1) See the alimentary canal of the *Daphnia pulex*, figured by Jurine, X, 7, and Randohr, Monoc., Tab. V, ii, d, d, and x.

The Polyropha of our third division—CLADOCERA, Lat.; *Daphnides*, Straus—from the second family of the Monoculi of Jurine. The form of two of their antennæ, which resemble ramified arms and serve as oars, and the faculty of leaping which they possess, have acquired for one of the most common species, the name of the *aquatic arborescent flea.*

The first of these naturalists, who has given us an excellent monography of the Daphniæ, a subgenus of this division, establishes two new ones; one by the name of LATONA, characterized by antennæ, in the form of oars, divided into three branches, of but one joint(2); and the other by that of SIDA, which approaches other known subgenera of the same division, in having similar antennæ, divided into two branches only, but of which one is composed of two joints, and the other of three(3). The Daphniæ, according to him, are distinguished from the preceding and from the Lyncei, inasmuch as one of the two branches of these oars is composed of three joints and the other of four. Jurine, however—Hist. des Mon. p. 92—states, that each branch is composed of three joints; but it seems that he did not include the first of the posterior branch, a very short one, it is true(4). The last, in all these Lophyropha, is terminated by three threads, and each of the preceding ones gives out another; these threads are either simple or barbed. There are also two other but very short antennæ—particularly in the females—situated at the anterior and inferior extremity of the head which have but a single joint with one or two setæ at the extremity. In the

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(1) See Mull., Entom. genus Cypris; Hist. des Monoc., second divis., Mon. à coquilles bivalves, p. 159—179, XVII—XIX; Rand., Mon., IV; Straus, Mém. du Mus. d'Hist. Nat., VII, 1; Desmar., Consid., p. 380—386, LV, 1—7. Desmarest—Crust. Foss., XI, 8—has figured a fossil species which he calls *Cypris fève*, found in great abundance near the Gergovian mountain in the Puy-de Dôme, and between Vichy-Les-Bains and Cussac.

(2) *Daphnia setifera*, Mull., Entom.

(3) *Daphnia cristallina*, Ejusd. Ibid.

(4) Randohr has given it in the fig., II, vii, tab. V, of these antennæ.

POLYPHEMUS, Mull.

As in Daphniæ and Lynceus, the antennæ are in the form of oars divided into two branches; but each of them is composed of five joints. The head, moreover, which is very distinct and rounded, is provided with a sort of neck, and is almost entirely occupied by a large eye. The feet are completely exposed.

But a single species has hitherto been discovered, the *Monoculus pediculus*, L.; Deg., Insect., VII, xxviii, 6—13; *Polyphemus oculus*, Mull., Entom., xx, 1—5; *Cephaloculus stagnorum*, Lam.; Jurine, Monoc., xv, 1—3; Desmar., Consid., LIV, 1, 2.

The feet, according to Jurine, have no resemblance whatever to the Monoculi of this division. They consist of a thigh, leg, and a tarsus composed of two joints, from the extremity of which, that of the last pair excepted, issue several small threads. Two small antennæ, consisting of a single joint and terminated by two threads, project from the anterior extremity of the head. The shell is so extremely diaphanous, that all the viscera can be distinguished. The matrix, when filled with eggs, occupies the greater part of its interior. Their greatest number never exceeds ten. In following the gradual development of the fœtus, we are struck with the early appearance of the eye, in comparison with that of other parts of the body. It is greenish at first, and passes insensibly to a deep black. The abdomen, after being flexed from behind forwards, bends suddenly backwards to form a long, slender, pointed tail, from which issue two long articulated threads. The animal always swims on its back, and most frequently in a horizontal direction, by the quick and repeated motion of its arms and feet, and executes all sorts of evolutions with ease and agility. When young, and after its first changes, it is subject to a disease called the *ephippium*(1); but this ephippium or saddle always has a determinate figure, and never contains the two oval ampullæ observed in the Daphniæ. These animals do not live long in a state of captivity, nor can their young ones be raised, at least such was the case with Jurine, who could not preserve them after their first changes. Among all the specimens which were the subjects of his observations, he could not find a single male, though, it is true, he could procure but very few of them, this species being rare in the environs of Geneva. It is said, however, to be very common in the marshes and ponds of the North, where it aggregates in considerable numbers. In the

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(1) See the following article, *Daphnia*, p. 128.

DAPHNIA, Mull.

The oars are always exposed to their base or to the origin of their peduncle; they are as long, or almost as long as the body, and are divided into two branches, the posterior of which consists of four joints, the first very short, and the other, or the anterior, of three. Their eye is small or punctiform, and with the exception of certain species, has not, as in Lynceus, the small black punctiform spot before it, which Muller considered as a second eye(1).

Although the extreme smallness of these animals might be supposed to defy any attempt to investigate their organization, but few are better known. Exclusive of those who have devoted themselves to microscopic researches, four of the most profound naturalists; Schæffer, Randohr, Straus, and Jurine, Sen., the third particularly, have studied them with the most scrupulous attention. If some anatomical details escaped the notice of the latter, the omission has been remedied by the labours of Randohr and Straus; Jurine also completes the observations of the former with respect to their habits, which he studied for a long period, and with the greatest success. The mouth is situated beneath at the base of the rostrum; we consider (with Randohr) the inferior portion of the head, which Straus denominates a labrum, as an elongated clypeus, and we apply the former term to that part which he styles the posterior lobule of the labrum. Directly under it are two strong jaws—interior jaws of Randohr—without palpi, vertically inclined, and applied to two horizontal jaws(2) terminated by three stout horny spines, in the form of recurved hooks. Then come ten feet, the second joint of all of which is vesicular; the first eight terminate by an expansion in the manner of a fin, the edges furnished with setæ or barbed threads arranged like a crown or a comb; the two anterior seem to be specially appropriated to the purposes of prehension, and in fact Randohr considers them as double palpi, the external and internal: they are the same parts, elsewhere—Cyclops—called hands by Jurine. In the figures which they have published, the terminal setæ appear to be

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(1) Such also is the opinion of Randohr, Monoc. pl. V, fig. II, iii, 6; and as he discovered it in the *Daphnia sima*, it is possible that, although but slightly visible in several species, this character may be common to this subgenus, and that of Lynceus. Schæffer had previously noticed it.

(2) The exterior jaws, in the language of Randohr; Jurine not having separated these parts from the preceding ones, supposed that the latter were accompanied by a kind of valve and by a palpus. Hist. des Monoc. IX, f. 13—17.

bearded: if this be so, we do not see why these appendages may not concur in the process of respiration(1), a property confined by Straus to the following ones, because the latter have, besides, a lamina on the inner side, which, with the exception of the two last, is edged with a pectinated series of setæ, that according to the figures of Jurine and Randohr are also bearded. The structure of the two last feet is somewhat different, and Randohr distinguishes them by the name of claws. The abdomen, or body properly so called, is divided into eight segments perfectly free between its valves, and is long, slender, recurved at the extremity, and terminated by two small hooks directed backwards. On the superior surface of the sixth segment is a range of four papillæ forming indentations, and the fourth presents a sort of tail(2). The ovaries are situated along the sides between this segment and the first, and open separately near the back into a cavity—matrix, Jurine—formed betwixt the shell and the body, in which the ova remain for some time after they are produced.

Müller has given the name of *ephippium*, or saddle, to a large, obscure, and rectangular spot, which at certain periods, and particularly in summer; appears, after the females have changed their tegument, on the superior part of the valves of the shell, and which he attributes to disease. According to Straus this ephippium presents two oval, diaphanous ampullæ, placed one before the other, and forming with those of the opposite side two small oval capsules, opening like that of a bivalve. It is divided, as are also the valves of which it forms a part, into two lateral halves, united by a suture along their superior edge; its interior exhibits another similar, but smaller one, with free edges, provided it be not the superior that is attached to the valves, the two halves of which, playing upon each other as if hinged, present the same ampullæ as the exterior lids. Each capsule contains an egg with a greenish and horny shell, otherwise similar to an ordinary ovum, but requiring a greater length of time for its development, and being destined to pass the winter in statu quo. When the animal is about to change its tegument, the ephippium, as well as its ova, is abandoned with the exuviæ, of which it constitutes a part, and which protect them during the winter from the cold. The heat of spring hatches them, and young Daphniæ are produced exactly similar to those which come from the ordinary eggs. Schæffer affirms that they will remain for a long period in a desiccated state without losing the vitality of the germ, but none of those preserved in that condition by Jurine was ever hatched. They are entirely free, or do not adhere to each other in their peculiar cavities. In summer, according to Jurine, they may be hatched in two or three days. In the climate of Paris, where Straus observed them at all periods of the year, they require at least one hundred hours. The fœtus, twenty-four hours after the production of the ovum, is a mere rounded and unformed mass, on which, when closely examined, may be seen obtuse rudiments of arms in the form of very short and imperfect stumps glued to the body; neither head nor eye is perceptible; and as yet, the green or reddish body dotted with white, like the egg, exhibits no motion. It is only at the ninetieth hour, and when the eye has appeared, and the arms and valves are elongated, that the fœtus begins to move. By the hundredth hour it is very active, and finally, at the hundred and tenth it only differs from the newly hatched animal in the setæ of the oars which are still glued to their stem, and in the tail of the valves which is bent under and received between their inferior edges. Towards the end of the fifth day, the tail, which terminates the valves in the young animal, and the setæ of the arms become free, and the feet for the first time begin to move. The young being ready to make their appearance, the mother lowers her abdomen and they dart out. Newly laid eggs deposited in a glass jar, where they were observed by Straus, were developed in this order. Jurine has also furnished us with the result of his analogous observations upon the successive changes in the embryo Daphniæ, but made during the winter, and as the eggs were not hatched till the tenth day, he could consequently detect their development with more precision. The ovum, on the first day, presents a central bubble, surrounded by smaller ones, with coloured molecules in the intervals. These bubbles and molecules appear destined to form the organs by approximating towards the centre, and finally disappear. The form of the fœtus begins to be defined on the sixth day; on the seventh the head and feet are distinguishable; on the eighth appears the eye as well as the intestine; on the ninth the network of that eye begins to be visible, and the bubbles have entirely disappeared, the central one excepted, which contains the alimentary canal under the heart; on the tenth the development of the fœtus is terminated, the young Daphnia issues from the matrix and for a moment remains motionless.

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(1) According to Straus, Cypris and Cythere are not true Branchiopoda, inasmuch as their feet are not provided with branchiæ; but, as we have already observed, the setæ and hairs of the two anterior ones and those of the antennæ may exercise the functions of branchiæ as well as those of the palpi and first jaws.

(2) We omit various details of the organization, because some can only be comprehended by means of drawings, and others appear common to most of the Branchiopoda.

The males, of those species at least observed by Straus, are very distinct from the females.. The head is proportionably shorter; the rostrum less salient; the valves narrower and less gibbous superiorly, and gaping in front in such a manner as to present a wide and almost circular opening. The antennæ are much larger and have the appearance of being furnished with two horns bent underneath, which are considered by Müller as the organs of generation. Straus could not discover these sexual parts, but he remarks that the little nail terminating the last joint of the two anterior feet—or the second, if we suppose the oars to be the first—is much larger than those in the female, that it has the form of a very large hook with a strong outward curvature, and that the seta of the third joint is also much longer; it is by means of these hooks that he seizes the female. The mammillæ of the sixth segment of the abdomen are much smaller, and at an early age have the form of tubercles. The inferior antennæ excepted, which are longest, the two sexes are nearly alike, and the two valves of their shell terminate in a stylet, dentated beneath, arcuated below, and nearly as long as the valves. Every time the animal changes its tegument, this stylet becomes shorter, so that in the adult it forms a mere obtuse point.

The males pursue their females with much ardour, and several frequently unite in their advances to the same individual.

A single copulation fecundates the female for several successive generations, and for a period of six months, as ascertained by Jurine. Straus, remarking that the orifices of the ovaries are placed very deeply under the valves and that consequently no part of the body of the male could reach them, suspects that he has no copulating organ, but darts the fecundating fluid under the valves of the female, whence it finds its way to the ovaries; analogy however seems to disprove this conjecture(1). Jurine saw them in actu, for a period of eight or ten minutes. The male, first placing himself on the back of the female, seizes her with the long threads of his anterior feet; he then seeks the inferior margin of her shell, and approximating the aperture of his own to that of the latter, he introduces the threads, as well as the hooks of these same feet. He now brings his tail in contact with that of his companion, who at first, refusing to comply, flies with her amorous mate, but finally yields. Little granulated bodies of a green, rose, or brown colour, according to the season, gradually ascend into the matrix and become eggs. Jurine observes, that the males of the *D. pulex* are but few, when compared to the number of females; that they are extremely rare in spring and summer, but less so in autumn.

About the eighth day after they are hatched, the young Daphnia effects its first change of tegument, and repeats the same process every five or six days, according to the increased or diminished temperature of the weather; it is not merely the body and valves which lose their epidermis, the branchiæ and setæ of the oars undergoing the same operation. It is only after the third change that they are fitted to continue their species. At first the female lays but a single egg, then two or three, gradually augmenting the number, which in the *D. magna* amounts to fifty-eight. The day after she has produced her ova, the female changes her skin, and in the teguments which she abandons may be found the shells of the eggs she has previously laid. The next moment a new batch is produced. The young from each set of eggs are generally of one sex; and it is rare to find two or three males proceeding from that which produced females, and vice versa. But in five or six of these broods, in the summer, one at most consists of males. Individuals are frequently remarked, whose integuments are of a milky white, opaque and thickened; they do not however appear to be affected by it, and on the renewal of the shell, but slight rugous traces of this alteration are perceptible.

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(1) See Jurine, Hist. des Mon. p. 106, et seq.

These animals cease to propagate, and no longer cast their skins on the approach of winter; they perish before the extreme cold has arrived. The ova contained in the ephippia, and which were laid during the summer, are hatched on the first approach of the vernal heat; and the ponds soon abound again with countless Daphniæ. Some naturalists attribute the occasionally sanguine tinge of these waters to the presence of myriads of the *D. pulex*, but Straus says he never remarked the fact, and that this species is at all times but slightly coloured. Morning and evening, and even during the day in cloudy weather, they keep on the surface; but in the heat of summer, or when the sun darts his rays directly upon the pools which they inhabit, they descend to the depth of six or eight feet; frequently, not one is to be seen on the surface. Their mode of natation is by little bounds, of a greater or less extent, according to the length of their oars, and in proportion to the projection of the shell which covers the body, an increase of its size impeding their movements. According to Straus, their food consists exclusively of small parcels of vegetable substances which they find at the bottom, and frequently of Confervæ. They always refused the animal substances he presented to them. He repeatedly saw them swallow their own fæces, carried along by the current formed by the action of their feet, which directs their ordinary aliment towards their mouth. They use the hooks which terminate the extremity of their tail to clean their branchiæ.

Daphnia pulex; Monoculus pulex, L.; *Pulex aquaticus arbores-*

cens, Swamm., Bib. Nat., xxxi; *Perroquet d'eau*, Geoff., Hist. Ins. II, 455; Schæf., Die Grün., arm., Polyp., 1755, I, 1, 8; Straus, Mem. du Mus. d'Hist. Nat. V, xxix, 1—20; Jurine, Mon., viii—xi. According to Straus, this species has a large convex rostrum; setæ of the oars plumose; first tubercle of the sixth segment linguiform; inferior edge of the valves dentated; valves terminated by a short tail, which is obtuse in the females. This last character distinguishes it from another species with which it has been confounded, the

Daph. longispina, Str. Deg. Insect. VII, xxvii, 1—4. The female is four millimetres in length(1).

The last subgenus of the Lophyropa is

LYNCEUS, Müll.—*Chilodorus*, Leach.

It can scarcely be distinguished from the preceding except by the oars, evidently shorter than the shell, the inferior portion of which has but little or no projection. According to Straus the articulations of the branchiæ are more numerous than in the preceding subgenera. They all have a little spot before their eye which has the appearance of a second one. The rostrum, longer in proportion than that of the Daphniæ, is curved and pointed(2).

The second section of the Branchiopoda, that of the PHYLLOPA, is distinguished from the first, as already stated, by the number of feet, which at least amounts to twenty(3) and by the lamellated or foliaceous form of their joints. There are always two eyes, which are sometimes pediculated: several of them have also an ocellus.

They form two principal groups.

In the first—CERATOPTHALMA, Lat.—there are never less than ten pairs of feet, nor more than twenty-two; the vesicular body at their base is wanting; the anterior are never much longer than the others, nor ramified. The body is contained in a shell resembling that of a bivalve, or is naked, each thoracic segment bearing a pair of exposed feet. The eyes are sometimes sessile, small and closely approximated; at others, and most frequently, they are situated at the extremity of two movable pedicles. The ova are internal or external, and are contained in a sac at the base of the tail.

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(1) For the other species, see Mem. cit. of Straus; Müll., Entom., and Jurine, Hist. des Mon. fam. II, p. 185—58, and p. 181, 200. For the *D. sima*, and *D. longispina*, see Rand., Monc. V—VII.

(2) See Müll., Entom., *G. lynceus*; Jurine, Monoc. p. 151, 158; and Desmar., Consid., 375—378.

(3) These animals represent among the Crustacea, the Myriapoda of the class of Insects.

Here the eyes are sessile and immovable; the body is invested with an oval shell resembling that of a molluscous bivalve, and the ovaries are always internal. Such is the

LIMNADIA, Ad. Brong.(1)

The Limnadiæ are so closely allied to the preceding subgenus, that the only species known was placed among the Daphniæ by the younger Hermann. The shell is bivalve, oval, and incloses the body, which is elongated, linear, and inflected forwards. In the head, and almost confounded with it, we find: 1, two eyes closely approximated and placed transversely; 2, four antennæ, two of which are much the largest, each composed of a peduncle of eight joints and of two setaceous branches or threads divided into eight segments and somewhat silky; the two others are intermediate, small, simple, and widened at base; 3, the mouth, situated beneath, and consisting of two inflated mandibles arcuated and truncated at the inferior extremity, and of two foliaceous jaws. These parts when united form a sort of inferior rostrum. The body, properly so called, is divided into twenty-three segments, each of which, except the last, bears a pair of branchial feet. All these feet are similar, strongly compressed, and bifid; their external division is simple, and ciliated on the exterior edge; the other has four joints, and is strongly ciliated along its interior margin. The first twelve pairs are of equal length, and larger than the others; the length of the latter progressively diminishes. The eleventh pair, and the two following ones, have a slender thread at their base, which ascends into the cavity situated between the back and the shell, in order to support the ova. The last segment on the tail is terminated by two threads. The ovaries are internal, and placed along the sides of the intestinal canal, extending from the base of the first pair of feet to the eighteenth; their openings appear to be at the root of some of those that are intermediate: The eggs, after having been produced, occupy the dorsal cavity above mentioned, and are secured there by means of small threads, which adhere to those of the feet. At first they are round and transparent; they afterwards assume a yellowish tint, which is subsequently darker towards the centre, and their figure becomes irregular and angular.

All the individuals examined by M. Ad. Brongniart were provided with them. The males, allowing the sex to exist, do not appear at the same time as the females, which is during the month of June, and are unknown.

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(1) In my work on the natural families of the animal kingdom, this subgenus, with that of *Apus*, composes my family of the Aspidiphora; it approximates to this one in the number of feet, and to the Daphniæ in the shell.

Limnadia Hermani, Ad. Brongn., Mém. du Mus. d'Hist. Nat., VI, xiii; *Daphnia-gigas*, Herm., Mém. Apterol., V. Found in great numbers in the little pools of the forest of Fontainebleau.

There, each eye is situated at the extremity of a pedicle, formed by a lateral prolongation, in the shape of a horn, of each side of the head. The body is naked, without a shell, and annulated throughout. The ova of the females are contained in an elongated capsule, situated near the base of the tail in those which are thus terminated, or in the posterior extremity of the body and thorax in those which have no tail.

Some are provided with a tail.

ARTEMIA, Leach.

Eyes placed on very short pedicles; the head confounded with an oval thorax, furnished with ten pairs of feet, and terminated by a long and pointed tail. The antennæ short and subulate.

A. salina; Cancer salinus, L.; Montag., Trans. Lin. Soc. XI, xiv, 8—10; *Gammarus salinus*, Fab.; Desmar., Consid., p. 393. A small species found in the salt marshes of Lymington, in England, when nearly dry, of which as yet we have but a very imperfect account.

BRANCHIPUS, Lat.—*Chirocephalus*, B. Prevost, and Jurine.

Eyes placed on projecting pedicles; the body narrow, elongated and compressed; the head distinct from the trunk, furnished with appendages varying according to the sex, and with two appendages resembling horns between the eyes; eleven pair of feet; the tail terminated by two leaflets more or less elongated and edged with cilia.

Although Schæffer and Benedict Prevost(1) have published very detailed monographs of two species of this genus, they are still imperfect with respect to the profound and comparative study of the organs of the mouth and of some other parts of the head. Considering the two sexes together, we find the following general conformation; the body is almost filiform, composed of a head separated from the trunk by a kind of neck; of a trunk or thorax longitudinally hollow beneath, divided, at least above, exclusive of the neck, into eleven segments, each bearing a pair of branchial, strongly compressed feet, usually composed of three foliaceous joints, with a

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(1) Mém. sur le Chirocéphale printed at the end of the Hist. des Monoc. of the late Lewis Jurine, and previously published in the Journal de Physique.

fringe of hairs or bearded threads along the edges; and of an elongated tail tapering to a point, consisting of nine segments terminated by two more or less elongated leaflets fringed with cilia. Under its second segment we find the male organs of generation, and in the female an elongated sac containing the ova she is ready to produce. In the head we observe, 1. Two reticulated eyes situated at the extremity of two flexible peduncles formed by lateral prolongations of the head; 2. Two antennæ at least, frontal, scarcely longer than the head, slender, filiform and composed of very small joints; 3. Two projections under them, sometimes resembling a uniarticulated horn, and at others digitiform—the premier doigt des mains, Bened. Prevost—and biarticulated; 4. A mouth underneath composed of two kinds of dentated mandibles without palpi, and of some other parts. We suspect that these horn-like projections are merely an appendage, larger and differently formed in the males, of the frontal antennæ; the two other antennæ may be wanting or be obliterated in the female, and form in the other sex of one of these species—*Chirocephala diaphana*, Prevost—those singular appendicated and dentated tentacula, in the form of a soft proboscis which is susceptible of being spirally convoluted, designated by Benedict Prevost under the name of doigts des mains, or fingers. It is probable that, as in Apus, the mouth is furnished with two pairs of jaws, a ligula and a labrum, but their respective form and situation have not yet been well ascertained. I am convinced that the part resembling a rostrum mentioned by Schæffer, and which Prevost calls a valve (soupape) is the labrum; that the four bodies or tubercles placed on the sides, mentioned by the former, are the mandibles and the two upper jaws; and that the parts considered by the second as cirri (barbillons) are also maxillary. The two first feet, which, according to Schæffer, are composed of but two joints, the last terminating in a point, would represent the two first foot-jaws of the Crustacea Decapoda, and the two large antenniform feet of an Apus(1). The chief of the male organs of generation, at least those which are considered as such, consist in two conoid biarticulated bodies, which only project by pressure (Schæffer), situated under the second ring, in which vessels terminate that arise from the first. M. Prevost presumes that the two vulvæ of the female are placed at the extremity of the tail, but that they afford no issue to the ova. This issue (two apertures according to Schæffer), is in the second ring, and communicates internally with the sac containing the eggs, which acts as an external matrix. But there is no crustaceous animal known in which the female organs of generation are placed at the posterior extremity of the body, and hence we can allow but little weight to this opinion.

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(1) See Mém. sur les Anim. sans Vertèb., Savign. part I.

The observations of Schæffer on the hairs of the feet of these Crustacea, prove that they are so many air tubes; even the surface of the feet of which they are composed, appears to absorb a portion of the air which adheres to it under the form of little bubbles.

> The *Chirocephalus diaphanus*, Bened. Prevost, which seems to us to be very closely allied to our *Branchipus palustris*, if it be indeed different, has, when first hatched, a body divided into nearly equal and almost globular masses. In the first we observe an ocellus, two short antennæ, two very large oars ciliated at the extremity, and two short, slender feet composed of five joints. After the first change of tegument the two compound eyes make their appearance, the body is elongated posteriorly, and terminated by a conical, articulated tail with two threads at the extremity. The subsequent changes gradually develope the feet, and the oars disappear. The valve—soupape—which at first extended over and covered the abdomen, diminishes in proportion.

The Branchipi are found, and usually in great numbers, in little muddy, fresh water pools, and frequently in those that are formed by heavy rains, particularly in spring and autumn. On the first approach of cold weather they perish. They swim with the greatest facility on their back, and their feet, which they cannot use for walking, while thus employed, present a graceful and undulating motion. This motion creates a current between them, which, following the canal of the thorax, directs to its mouth the atoms which constitute its food; when the animal wishes to advance it strikes the water, right and left, with its tail, which forces it forwards by bounds and leaps. Withdrawn from its element, it moves its tail for a while, and curves itself into a circle. Deprived of a certain degree of humidity, it remains motionless.

Benedict Prevost states, that when the male of the species which constitutes the object of his memoir seeks his female, he swims round her, seizes her by the neck with the two horn-like appendages of his head, and remains fixed there, until she turns up the posterior extremity of her tail, in order to approximate the two valves of the copulating organs; this process is analogous to the coitus of the Libellulæ. The ova are yellowish, spherical at first, and afterwards angular; the shell is thick and hard, a circumstance which tends to preserve them. It appears that even desiccation, provided it be not carried too far, produces no change in the germ, and that the young are hatched as soon as a sufficiency of rain has fallen. M. Desmarest has frequently remarked Branchipi in the little hollows filled with rain water, on the summit of the rocks at Fontainebleau. The female Chirocephalus produces several distinct sets of eggs, after each copulation, at different times, occupying some hours and even the whole day in the process. Each set consists of from one to four hundred eggs; they are rapidly ejected from the female in jets of ten or a dozen, and with sufficient force to sink them slightly in the mud.

Benedict Prevost has remarked that the *Chir. diaphanus* was subject to certain diseases, of which he gives a description. This species, as we have already stated, does not differ from our *Branchipus palustris*(1). The two horns, situated under the superior antennæ, are composed, in both sexes, of two joints, the last of which, however, is large and arcuated in the male, and very short and conical in the female. In the *Branchipus stagnalis*(2), the horns consist of a single joint, and those of the males resemble the mandibles of the *Lucanus cervus*, in their form, dentations, and direction.

Others have no tail; their body terminates almost directly behind the thorax and last feet. Such is the

Eulimene, Lat.

The body of the Eulimenes is almost linear, and has four nearly filiform antennæ, two of which are smaller than the others, bearing a great resemblance to palpi, and placed on the anterior extremity of the head. Their head is transverse, with two eyes seated on large and cylindrical peduncles. There are eleven pairs of branchial feet, the three first joints and the last small and tapering; directly after them follows a terminal and nearly semiglobular piece replacing the tail, and from which issues an elongated thread, that, perhaps, is an oviduct. Near the middle of the fifth pair of feet, and of the four following ones, I have remarked a globular body, possibly analogous to the vesicles presented by these organs in the following subgenus.

The only species known, *Eulimène blanchâtre*, Lat., Règne Animal, Cuv., III, p. 68; Nouv. Dict. d'Hist. Nat. X, 333; Desmar., Consid. p. 353, 354, is very small; whitish eyes, and posterior extremity of the body blackish. From the vicinity of Nice.

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(1) *Cancer paludosus*, Müll. Zool. Dan. XLVIII, 1—8; Herbst., XXXV, 3—5; *Chirocephalus diaphanus?* Prev., Journ. de Phys.; Jurin., Monoc., XX—XXII. See Desmar., Consid. LVI, 2—5. This last species is described in the Manuel du Naturaliste of Duchesne under the name of *Marteau d'eau douce*.

(2) *Branchiopoda stagnalis*, Lat., Hist. des Crust. et des Ins., IV, p. 297; *Cancer stagnalis*, L.; *Gammarus stagnalis*, Fab.; *Apus pisciformis*, Schæff.; *Gammarus stagnalis*, Herbst., XXX, 3—10.

The remaining Phyllopa—ASPIDIPHORA, Lat.—have sixty pairs of feet, all furnished externally near their base with a large oval vesicle(1), and the two anterior of which, although much larger and ramous, resemble antennæ; a large shell, covering the greater part of the superior portion of the body, almost entirely free, clypeiform, emarginated posteriorly, provided anteriorly in a circumscribed space with three simple, sessile eyes, the two anterior of which are largest and lunated; and two bivalve capsules containing the ova, and annexed to the eleventh pair of feet. Such are the characters which mark the

APUS, Scop.,

Which makes part of the genus Binoculus, Geoff., and of the Limulus, Müller.

The body, including the shell, inclines to an oval, wider and more rounded before, and narrowed behind in the manner of a tail; abstracting the shell, it is at first nearly cylindrical, convex above, concave and divided longitudinally beneath by a furrow, and terminates in an elongated cone. It consists of thirty annuli, which are considerably smaller at the posterior extremity, and which, the last seven or eight excepted, give origin to the feet. The first ten are membranous, soft, without spines, exhibit a small button-like prominence on each side, and have each but a single pair of feet. The others are more solid or horny, with a range of small spines on the posterior margin; the last is larger than the preceding ones, nearly square, depressed, angular, and terminated by two articulated threads or setæ. In some species composing the genus LEPIDURUS, Leach, a horny, flattened and elliptical lamina is seen between them. If the number of feet be about a hundred and twenty, the last annuli, beginning with the eleventh or twelfth, must necessarily have more than one pair, a circumstance which in this respect approximates these Crustacea to the Myriapoda. The shell, perfectly free from its anterior adhesion, invests a great part of the body, and thus protects the primary segments, which, as already stated, are softer than the others. It consists of a large, horny, extremely thin, and almost diaphanous scale or plate, which represents the superior teguments of the head and thorax united, and forming a large, oval, convex shield, angularly notched and dentated at its posterior extremity. Its upper surface is divided by a transverse line forming two united arcs, in two areas, the anterior nearly semilunar, corresponding to the head, and the posterior to the thorax. In the middle of the first, we observe three closely approximated simple eyes, or without apparent facets, the two anterior of which are largest and almost reniform, and the posterior much smaller and oval. A duplicature of the anterior portion of the shell forms a sort of frontal, flattened, semilunar shield beneath, which serves as a base to the labrum. The posterior area, that which corresponds to the thorax, is carinated throughout the middle of its length. This shell is only adherent by its anterior extremity, so that looking from this point we can discover the whole back of the animal. Each side of the shell, seen from beneath and in a strong light, presents a large spot, formed by numerous lines describing concentric ovals, which appear to be tubular and filled with a red fluid. Directly under the shield or frontal disk, we find the antennæ and mouth. The former, two in number, are inserted on each side of the mandibles, are very short and filiform, and are composed of two nearly equal joints. The mouth consists of a square, projecting labrum; of two strong, horny, inferiorly inflated mandibles, compressed and dentated at the extremity and without palpi; of a large and profoundly emarginated ligula; and of two pairs of foliaceous jaws laid on each other, the superior of which are spinous and ciliated along the inner margin, and the inferior almost membranous and similar to small false feet; they are terminated by a slender, elongated joint, and are prolonged externally from their base into a species of auricle, (oreillette) furnished with a uniarticulated and ciliated appendage, which may be considered as a kind of palpus. According to Savigny(1), the ligula exhibits a ciliated canal, which leads directly to the œsophagus. The feet, which amount to about one hundred and twenty, insensibly diminish in size, commencing from the second pair; they are all strongly compressed, foliaceous, and are composed of three joints, exclusive of the two long threads at the extremity of the two anterior feet, and the two leaflets at the end of the following ones, parts, which, when united, we may consider as constituting a fourth, forceps-like joint, or one with two elongated toes converted into a sort of antenniform threads. On the posterior side of the first joint is inserted a large, branchial, triangular membrane; the second also, on the same side, has a red, vesicular and oval sac. On the opposite margin of these feet are four triangular and ciliated leaflets, the superior of which is closely approximated to the toes of the forceps, appearing to form a third to the second and following feet, as far as the tenth pair. In proportion as these organs diminish in size, the leaflets approximate more closely, the forceps is more clearly defined and less pointed, and the first toe becomes wider, shorter and rounder. The two anterior feet, which are much larger and are formed like oars, resemble ramous antennæ, and have been considered as such by some writers(1): they exhibit four multi-articulated setaceous threads, the two last joints, one of them particularly, being much longer than the others which are situated on the internal side or anteriorly. The two at the extremity are evidently analogous to the toes of the forceps, the remaining two also correspond to as many of the lateral leaflets; it is easy to convince ourselves of this by comparing these parts in young specimens. After their sixth or seventh change of tegument, the two or three following feet of the latter greatly resemble the two anterior ones, and even their antennæ are longer in proportion than in the adult, and are terminated by setæ or hairs. The eleventh pair are very remarkable(2). The first joint, behind the vesicles, presents two circular valves, laid one on the other, formed by two leaflets, and containing the ova, which resemble granules of a bright red colour. Every specimen which has hitherto been examined being always found to possess this kind of feet, they have been considered as hermaphrodites, and are considered capable of self-impregnation.

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(1) Possibly analogous to the vesicles forming the second joint of the feet of the Daphniæ.

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(1) Mém. sur les Anim. sans Verteb., Savig., part I, fasc. I.

These animals inhabit ditches, pools, stagnant waters, &c. and usually in myriads. Abducted, when thus assembled, by violent winds, they have been seen to descend in rain. They generally make their appearance in spring; and in the beginning of summer. Their customary food is the Tadpole. They swim well on their back, and when they sink into the mud they erect their tail. When first produced they have but one eye and four feet, resembling arms or oars, furnished with tufts of hairs, the second of which are the largest. Their remaining organs are regularly developed after each change of tegument. M. Valenciènnes, an attaché of the Mus. d'Hist. Nat. has remarked that these Crustacea are frequently devoured by the bird vulgarly called the *Lavandière*(3).

The number of species known being very small, it is unnecessary to imitate Leach in forming a separate genus—LEPIDURUS, Leach—for those which have a lamina between the threads of the tail. Such is the *Apus prolongatus; Monoculus apus*, L.; Schæff., Monoc., VI; *Limule serricaude*, Herm., Jun.; Desmar., Consid. LII, 2. The carina of the shield terminates posteriorly in a small spine, which is not seen in the *Apus canciformis; Binocle à queue en filet*, Geoff., Insect., XXI, 4; *Limulus palustris*, Müll.; Schæff., Monoc. I—V; *Apus vert*, Bosc.; Desmar., Ib., LI, 1; the latter, besides, has no lamina between the caudal threads; it is the type of the genus APUS, Leach, or the Apus properly so called. The same naturalist has figured another species, *Apus Montagui*, Edinb. Encyclop. Suppl. I, XX.

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(1) They also seem to represent the two first foot-jaws.

(2) Schæffer distinguishes them by the name of uterine feet. The preceding nine pairs, according to his phraseology, form forceps, those of the first oars, or true feet; finally, those which follow the uterine feet, or the twelfth pair and following ones, *branchial feet*. The vesicular sacs lengthen and lessen just as gradually; their use is unknown.

(3) The *Motacilla alba*, and *cinerea*, L. *Am. Ed.*

ORDER II.

PÆCILOPODA.

The Pæcilopoda are distinguished from the Branchiopoda by the diversity in the form of their feet, among the anterior of which an indeterminate number are ambulatory, or fitted for prehension; while the others, lamelliform or pinnate, are branchial and natatory. It is principally, however, by the absence of the usual mandibles and jaws that they are removed from all other Crustacea. Sometimes these parts are replaced by the spinous haunches of the first six pairs of feet; and sometimes the organs of manducation consist either of an external siphon in the form of an inarticulated rostrum, or of some other apparatus fitted for suction, but concealed or slightly apparent.

Their body is almost always, either wholly, or for the greater portion, invested with a shell in the form of a shield, consisting of a single plate in most of them, and of two in others, which always presents two eyes when those organs are distinct. Two of their antennæ—*Cheliceres*, Lat.—form a forceps in several, and fulfil its functions. Most of them have twelve feet(1), and nearly all the remainder have either ten or twenty-two. Their usual habitat is on aquatic animals, and most commonly on fishes.

We divide this order into two families(2).

FAMILY I.

XYPHOSURA.

This family is distinguished from the second by several characters: there is no siphon; the haunches of the first six pair of feet are covered with small spines and perform the office of jaws; there are twenty-two feet; the first ten, with the exception of the two anterior ones in the males, are terminated by a didactyle forceps, and inserted, as well as the two that follow, under a large semi-lunar shield; the latter have the sexual organs attached to them, and the form of large leaflets, as in the case with the ten following, which are branchial and inserted under a second shell, terminated by a very hard, ensiform and movable stylet. They are wandering animals, and form the genus

LIMULUS, Fab.

The species are known in commerce by the name of the Molucca Crab. The suborbicular, slightly elongated and posteriorly narrowed body is divided into two parts, invested by a solid shell composed of two pieces, one to each part, very hollow beneath, and presenting above, two longitudinal sulci, one on each side, and a carina on the middle of the back. The first part of the shell, or that which covers the fore-part of the body, is much larger than the other, forms an extensive semi-lunar shield, with a reflected edge, furnished above with two oval eyes of numerous facets, resembling granules, one on each side, exterior to a longitudinal carina; and on the anterior extremity of the middle one, and common to both pieces of the shell, two small, closely approximated, simple eyes(1); these carinæ are armed with teeth or acute tubercles. The duplicature of this shell at its anterior extremity, beneath, forms a level border, strongly arcuated, and terminated inferiorly by a double arc, projecting like a tooth towards the centre of union. Immediately under this projection, in the cavity of the shield, is a small inflated labrum, carinated in the middle and terminating in a point, above which are inserted two little antennæ, in the form of small didactyle forceps, flexed into an elbow in the middle of their length, at the point of union between the first joint and the second, or of the forceps properly so styled. Directly beneath, inserted and approximated by pairs, and on two lines, are twelve feet, the ten first of which, the two or four anterior ones of the males excepted, terminate in a didactyle forceps; their radical joint, projecting inwards like a lobe and covered with points, performs the office of a jaw. The size of these feet augments progressively; those of the fifth pair excepted, they are all composed of six joints, the movable toe of the forceps included. The latter have an additional joint, and also differ from the preceding ones by having, at their external base, a bi-articulated appendage, directed backwards, the last joint of which is compressed and obtuse; by their fifth joint being terminated on the inner side by five small, movable, horny, narrow, elongated and pointed leaflets, and by the two toes of the forceps being movable or articulated at base. The two pieces situated between these feet, which M. Savigny considers as the ligula, appear to me to be merely two maxillary lobes of these organs, but detached or free. The pharynx occupies the interval included by all these feet. The males are distinguished from the females by the form of the forceps, which terminate the two or four anterior feet: they are inflated and deprived of the movable toe. The two last feet of this shield are united in the form of a large, membranous, and almost semi-circular leaflet, having the sexual organs on its posterior face, and presenting, in the middle of an emargination of the posterior margin, two small triangular, elongated and pointed divisions, which appear to represent the internal toes of the forceps; the other articulations are indicated by sutures. The second piece of the shell, articulated with the first in the middle of its posterior emargination and filling the interval it forms, is nearly triangular, and is angularly truncated and emarginated at its posterior extremity. Its lateral edges are alternately emarginated and dentated, and in the middle of each of the emarginations, counting from the second, is an elongated and movable spine, six on each side. Inclosed in the inferior cavity, and disposed in pairs on two longitunal ranges, are ten fin-like feet, almost similar in form to the two last, but simply united at base, laid one on the other, and bearing, on their posterior face, the branchiæ which appear to be composed of numerous and crowded fibres arranged on the same plane one against the other. The anus is situated at the inferior root of the stylet terminating the body. According to an observation communicated to us by M. Straus, we only find in the interior of the first shield, besides the brain, a single sub-œsophagal ganglion(1). The two nervous cords are then prolonged into the interior of the second shield, forming there, and at the origin of the branchial feet, some small ganglia, which send branches to those organs. According to Cuvier, the heart, as in the Stomapoda, is a large vessel furnished internally with fleshy columns, extending along the back, and giving out branches on both sides. A wrinkled œsophagus, ascending in front, leads to a very muscular gizzard, lined with a cartilaginous kind of velvet, studded with tubercles, and followed by a wide and straight intestine. The liver pours its bile into the intestine by two ducts on each side. A great portion of the shell is filled by the ovaries in the female, and by the testes in the male.

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(1) Fourteen in several, according to Leach; those which he considers as the two first, however, appear to me to be two inferior antennæ. The Arguli, which seem to be the most favoured subgenus with respect to locomotion, have but twelve feet.

(2) In my Fam. Nat. du Règne Anim., they form two orders.

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(1) One on each side of the tooth that terminates this carina.

These animals are sometimes found two feet in length; they inhabit the seas of hot climates, and most generally frequent their shores. They appear to me to be proper to the East Indies and the coast of America. The species found in France—*L. cyclops*—is commonly called the *Casserole*(2), from its having some resemblance to the form of that utensil, and because when the feet are removed its shell is used to hold water. Major Le Conte, one of the most intelligent of naturalists in the United States, and who has so largely contributed to advance the science of entomology by his discoveries and researches, states that it is given to the hogs. Savages employ the stylet of the tail to point their arrows, which, thus armed, are much dreaded. Their eggs are eaten in China. When these animals walk, their feet are not seen. Fossil specimens are found in certain strata of a moderate antiquity(3).

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(1) The two anterior feet may represent the mandibles of the Decapoda, the four following ones their jaws, and the last six their foot-jaws; those of the second shield would correspond to the thoracic feet.

(2) The *King-crab* of our fishermen, or the *Horse-shoe*. Very common on the coast of New Jersey. *Am. Ed.*

(3) Knorr, Monum. of the Deluge, I, pl. XIV; Desmar., Crust. fossil., XI, 6, 7. It would seem from these figures that the lateral spines of the second piece of the

In some, the four anterior feet, at least in one of the sexés, are terminated by a single toe.

> But a single species of this division is known; it is the *Limulus heterodactylus*, and is the type of the genus *Tachypleus*, Leach(1). I have seen it figured on Chinese vellums.

In the others, the two anterior claws at most, are alone monodactyle. All the ambulatory feet are didactyle, at least in the females. This division is composed of several species, which, owing to the little attention that has been paid to the detailed form of their parts, to the differences resulting from sex and age, and from their peculiar localities, have not yet been characterized in a rigorous and comparative manner. The common American Limulus for instance, when young, is whitish or of a light colour, and has six stout teeth along the whole ridge of the middle of the upper shell, and two others equally strong and pointed on each lateral ridge of the shield or of the first piece of that shell; while older specimens, sometimes more than a foot and a half in length, are of a deep brown colour or almost blackish, their teeth, the middle ones especially, being almost obliterated. Here also the lateral margins of the second piece of the shell are marked with fine dentations which are scarcely apparent or wanting in the former.

> We should consider as young individuals the *Lim. cyclops*, Fab., and the *L. Sowerbii*, Leach, Zool. Miscell., LXXIV; his *L. tridentatus*, and the *L. albus*, Bosc.: and as older ones, my *Limule des Moluques*; *Monoculus polyphemus*, L.; Clus., Exot., lib. VI, cap. xiv, p. 128; Rumph., Mus., XII, a, b, which I at first considered a distinct species, under the belief that these large individuals inhabited those islands exclusively. In all of them, or at all ages, the tail is somewhat shorter than the body, and triangular, the upper ridge finely denticulated and without any decided sulcus beneath. We will designate this species by the name of *Limulus polyphemus*. These latter characters will distinguish it from some others described by Dr Leach(2).

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shell, in lieu of spines, merely form smaller teeth articulated at base; but these articulations have perhaps disappeared.

(1) This Limulus is perhaps the *Kabutogani* or *Unkia* of the Japanese, and represents the constellation of Cancer on their primitive Zodiac..

(2) See Nouv. Dict. d'Hist. Nat. Ed. II; Desmar., Consid., p. 344—358.

FAMILY II.

SIPHONOSTOMA.

The Siphonostomæ have no kind of jaws whatever. A sucker or siphon, sometimes external and in the form of an acute inarticulated rostrum(1), and at others concealed or but slightly visible, fulfils the functions of a mouth. There are never more than fourteen feet. The shell is very thin and composed of a single piece. They are all parasitical.

We will divide this family into two tribes.

The first—Caligides, Lat.—is characterized by the presence of a shell resembling an oval or semi-lunar shield; by the number of visible feet, which is always twelve,—or fourteen, if we include those which Leach considers as such, and which I call inferior antennæ; by the form and size of the tenth pairs which are sometimes multifid, pinnate or terminated in a fin, and well adapted at all times and in the adult, for the purposes of natation, and sometimes foliaceous, or broad and membranous. The sides of the thorax are never furnished with wing-like expansions directed backwards and enclosing the body posteriorly.

Here, the body, exhibiting several segments above, is elongated and narrowed posteriorly, terminating in a kind of tail with two threads or as many other salient appendages at the end; this extremity is not covered by a segment of the superior teguments in the form of a large rounded scale, deeply notched in the posterior margin. The shell is at least half the length of the body. This subdivision will comprise two genera of Muller.

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(1) The composition of this rostrum or beak is not well known. It is evident, from the figure of the *Argulus foliaceus*, given by Jurine, Jun., that it contains a sucker; but is this the case with the others, and of how many pieces is it composed? I cannot answer the question. I presume, however, that this siphon consists of the labrum, mandibles and the ligula which forms the sheath of the sucker. In the preceding Entomostraca, the four anterior feet, whose form is very different from that of the following ones, would correspond to the four jaws of the Decapoda,

ARGULUS, Mull.

This genus was at first designated under the name of *Ozolus*, and but very imperfectly described. Jurine, Jun. has since studied its type with the most scrupulous attention, followed it throughout all its changes of age, and produced a perfect and complete monograph of it. He has restored to the genus the original name given by Müller.

The Arguli are furnished with an oval shield, posteriorly emarginated, covering the body, the posterior extremity of the abdomen excepted, and bearing on a mediate, triangular space distinguished by the name of clypeus, two eyes, four very small, almost cylindrical antennæ placed in front, the superior of which, shorter and triarticulated, have a stout, edentated and recurved hook at their base; and the inferior quadriarticulated, with a small tooth on the first joint. The siphon is directed forwards. There are twelve feet. The two first terminate in a transversely annulated disk, striated and edentated along the margin, and presenting internally a sort of rosette formed by the muscles, and apparently acting in the manner of a cup or sucker. Those of the second pair are prehensile, the thighs large and spinous, and the tarsi composed of three joints, the last of which is provided with two hooks. The remaining feet are terminated by a fin formed of two elongated pinnulæ, whose edges are fringed with bearded threads: the two first of the latter, or those of the third pair, including the four that precede them, have an additional but recurved toe. The two last are annexed to that portion of the body which projects posteriorly from the shell, or the tail. The female has but a single oviduct covered by two small feet situated behind the two palettes. The organ which is considered as the penis of the male, is placed at the internal extremity of the preceding joint of the same feet near the origin of the two toes. On the same joint of the two preceding feet, and facing these organs of copulation, is a vesicle presumed to be seminal. The abdomen, by which we mean that part of the body which extends posteriorly from the ambulatory feet, the rostrum, and a tubercle containing the heart, is entirely free, without distinct articulations, and terminates directly after the last feet behind, by a sort of tail, in the form of a rounded lamina, deeply emarginated or bilobate, and without terminal hairs: it is a species of fin. The body is so transparent that the heart may be distinguished through its parietes. It is situated behind the base of the siphon, lodged in a solid tubercle, semi-diaphanous and composed of a single ventricle. The blood, formed of little diaphanous globules, is impelled forwards in a column which soon divides into four branches, two of which proceed directly towards the eyes, and two towards the antennæ; the latter are then reflected backwards and united to the former, constituting a single column on each side, which descends towards the cup, turns round its base, and disappears. A little beneath the two following feet, we may distinguish on each side, another sanguineous column which curves outwards, extends along the borders of the shell, and having reached the two penultimate feet, is flexed forwards and ceases to be visible. Another, where, as in the preceding, the blood flows from the anterior part of the body to the posterior, traverses longitudinally the middle of the tail; it unites behind with two other currents that may be seen on the edges of the tail, but which flow in a contrary direction, or appear to return the blood to the heart. Jurine avoids using the term vessel, because the blood which is driven into the anterior part of the body, appears to be diffused there in such a manner, as to induce us to believe that its globules, instead of being contained in particular vessels, are dispersed in the parenchyma of those parts. From what we have stated, however, with respect to the circulation in the Decapoda, it is evident, that the blood, in the first instance, is distributed in the Arguli in the same way, and that the currents or columns of which we have just spoken, seem to indicate the existence of peculiar vessels. This able observer, in fact, subsequently acknowledges that the circulation is not every where carried on in so diffused a manner as in the anterior part of the shell, where, however, in our opinion, it is effectuated as in the Decapoda. The brain, which is situated behind the eyes, appeared to him to be divided into three equal lobes, one anterior and two lateral. The anterior part of the stomach gives origin to two large appendages, each divided into two branches, which ramify in the wings of the shell. The brownish coloured aliment they contain renders these ramifications visible. The cæcum is provided near its origin with two vermiform appendages.

The excessive ardour of the males frequently induces them to mistake one sex for the other, or to make their advances to pregnant or dead females. They are placed in coition on their back, to which they cling by means of their feet with cups, for several hours. The period of gestation is from thirteen to nineteen days. The ova are smooth, oval and milk-white. They are fixed with gluten on stones or other indurated bodies, either in a straight line or in two ranges, and from one to four hundred in number; being pressed against each other, their form becomes almost hexagonal.

Twenty-five days after the extrusion of the ova, and after they have assumed a yellowish and opaque tinge, the eye and parts of the embryo are perceptible. In about ten days more, the shell opens longitudinally, and the tadpole issues from it, being at this period about three-eighths of a line in length. Its general form is similar to that of the adult, but the organs of locomotion present a very essential difference. Müller has described it in this state by the name of *Argulus charon.* Four oars or long arms, two situated before the eyes and two behind, each terminated by a pennate and flexible pencil of hairs that have a simultaneous motion, by which the animal is impelled by jerks, project from the anterior extremity of the shell: they do not represent the antennæ, for they also are visible. The feet with cups are replaced by two stout feet, flexed into an elbow near the extremity, and terminated by a stong hook, with which it clings to Fishes. The only feet proper to the adult, that are developed and free, are those of the second and third pairs, or the two ambulatory and the two first natatory feet; the following ones are as yet fixed to the abdomen. The heart, proboscis, and ramifications of the appendages of the stomach are distinct. After the first change of tegument, which is effected by a laceration of its inferior surface, the oars disappear, and all the natatory feet are visible. In three days more the second change ensues, but without producing any important alteration. But after the third, which occurs forty-eight hours subsequently to the second, these same feet are converted into those with cups, still, however, preserving the terminal hook. At the expiration of nine days, there is a new change of skin, and the organs of generation, male and female, are apparent; another change of tegument however is required ere the sexes are fitted for copulation, so that the period of their metamorphosis extends to twenty-five days. Still, however, they have attained but the half of their proper size. For that purpose fresh changes of the tegument, which occur every six or seven days, are requisite. Jurine satisfied himself of the fact, that propagation never ensues without the intervention of the male. The females, which he kept separate, perished from a disease which was announced by the appearance of several brown globules, arranged in a semicircle on the posterior portion of the clypeus, and apparently formed in the parenchyma, for they were not dispersed by the change of tegument.

Argulus foliaceus, Jurine, Jun., Ann. Mus. d'Hist. Nat. VII, xxvi; *Monoculus foliaceus*, L.; *Argulus delphinus*, Herm. Jun., Mem. Apter., V, 3, VI, ii; *Monoculus gyrini*, Cuv., Tabl., Elem. de l'Hist. Nat. des Anim., p. 454; *Ozolus gasterostei*, Lat., Hist. Nat. des Crust. et des Insect., IV, xxix, 1—7; Desmar., Consid., L.; *Louse of the Stickleback*, Baker, Micros., II, xxiv. This species, the only one of the genus that is known, attaches itself to the under part of the body of the tadpoles of Frogs, of that of the Stickleback or Gasterosteus, and sucks its blood. The body is flattened, of a light yellowish green colour, and about two lines and a half in length. Hermann, Jun., who has well described this Argulus in its perfect state, and who quotes a manuscript of Leonard Baldaneur a fisherman of Strasbourg, dated 1666, in which the same animal is figured, says, that in the environs of that city it is seldom found, except on the Trouts, and that it frequently kills them, those especially which are kept in ponds; it is also found on the Perch, Pike, and Carp. He has never found it on the gills. It has a habit of whirling round like the Gyrini. He says that the body is divided into five rings, but slightly distinct on the back.

CALIGUS, Mull.

Neither of the feet with cups; those of the anterior pair unguiculated; the others divided into a greater or less number of pinnulæ or membranous leaflets. A considerable portion of the body is not covered by the shell, and is usually terminated posteriorly by two long threads, and sometimes by fin-like or styliform appendages(1).

The vulgar name of *fish-louse*, by which they are collectively designated, announces their habits to be similar to those of the Arguli and other Siphonostomæ. Several naturalists have considered the tubular threads at the posterior extremity of their body as ovaries; I have sometimes found ova under the posterior and branchial feet, but never in these tubes. Besides, external oviducts thus prolonged are never met with except in females whose eggs are to be deposited in deep holes and cavities—now this is not the case with the Caligi. Müller and other zoologists have remarked that these Crustacea erect and agitate the appendages in question. We believe with Jurine, Jun., and such also is the opinion of his father, that they serve for respiration, like the terminal filaments of the abdomen of an Apus(2).

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(1) The interval also frequently exhibits other, but smaller or much less salient appendages.

(2) In the Ann. Génér. des Sc. Phys., vol. III, p. 343, Brussels, is an extract from the observations of Dr Surriray on the fœtus of a species of Caligus which he believes to be the *elongatus*, and which is very common on the operculum of the *Esox belone*. That gentleman informs us that by pressing the two caudal threads of the animal in question, a number of transparent and membranous ova were extruded, each of which contained a living fœtus, very different from the mother, and of which he gives a description. From these observations we might be induced to conclude that these threads are a kind of external oviducts: but is there

Some of them whose feet are free, and (the two last excepted) annexed to the anterior part of the body—Cephalothorax, Lat.—covered by the shield, in which some of the posterior feet are furnished with numerous and pennated threads, and in which the siphon is not apparent, have the abdomen naked above and terminated by two long threads, or as many stylets; they compose the subgenus

CALIGUS, properly so called.—*Caligus risculus*, Leach(1).

In all others, the superior surface of the body is imbricated, or that portion of the body is enclosed in a kind of case formed by the last feet which resemble membranes and fold over it.

Of these latter, there are some whose antennæ never project like little claws, whose feet are free, and whose last ones do not envelope the body like a membranous case. They form the following subgenera.

PTERYGOPODA, Lat.—*Nogaus?* Leach.

Where the posterior extremity of the body is terminated by two kinds of fins; where the under part of the post-abdomen or of the second division of the body, not covered by the shield, is furnished with pinnated or digitated feet; and where there is a distinct proboscis or rostrum(2).

PANDARUS, Leach.

Two threads at the posterior extremity of the body; the first and fifth pairs of feet unguiculated, and the remainder digitated; no apparent siphon(3).

DINEMOURA, Lat.

Two long anal filaments and an apparent siphon; the two anterior feet unguiculated; the two following ones terminated by two long toes, and the remainder membranous leaflets(1).

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no mistake in this? I have studied these same organs in various specimens—preserved in spirits, it is true—but could never discover any body whatever.

(1) *Caligus piscinus*, Lat.; *Cal. curtus*, Müll. Entom., XXI, 1, 2; *Monoculus piscinus*, L.; *Cal. Mulleri*, Leach; Desmar., Consid., L, 4; found on the Cod. The *Oniscus lutosus*, Slabber, Encyclop. Méthod., Atl. d'Hist. Nat. CCCXXX, 7, 8, from the fin-like appendages of its tail, seems to indicate a separate subgenus. The *Binocle à queue en plumet*, Geoff., might be placed in it.

(2) A single living species found on the Shark. See the genus *Nogaus*, Desmar., Consid., p. 340.

(3) *Pandarus bicolor*, Leach; Desmar., L., 5; *Pandarus Boscii*, Leach, Encyc. Brit. Suppl. I, xx. For the other species, see Desmar., Ib., p. 339.

(1) *Caligus productus*, Müll., Entom. XXXI, 3, 4; *Monoculus salmoneus*, Fab.

The last subgenus of this subdivision, that of

ANTHOSOMA, Leach,

Approximates to Dinemoura in the presence of a siphon, and in the two caudal threads; but it is removed from it, as well as the preceding ones by its projecting antennæ which resemble little monodactyle claws, and by its six last feet which are membranous, united inferiorly, and folded laterally over the post-abdomen, enveloping it like a case; those of the first and third pairs are unguiculated; the second feet are terminated by two short and obtuse toes(2).

There, the body is oval, without salient caudiform appendages, composed of threads or fin-like productions at its posterior extremity. A portion of the superior teguments forms a shield, which does not cover its anterior half, is rounded and emarginated before, widened and as if bilobate behind; then follow three pieces or scales, posteriorly rounded and emarginated, the second of which, and the smallest of the three, is almost in the form of a reversed heart; the last, and the largest, is arched. The four posterior feet are in the form of laminæ, and are united by pairs; those of the first and the third are unguiculated; the extremity of the second is bifid. The siphon is apparent. The ova are covered by two large, oval, contiguous, coriaceous pieces, placed under the abdomen, and surpassing it in length. Such are the characters of the genus

CECROPS, Leach,

Of which a single species only is known.

Cecrops Latreillii, Leach, Encyc. Brit., Supp. I, xx; 1, 3, the male; 2, 4, the female; 5, the antennæ magnified; Desmar., Consid. L, 2. Found on the branchiæ of the Tunny and Turbot.

The second tribe, that of the LERNEIFORMES, Lat., consists of Entomostraca, which approximate to the Lerneæ, in their external configuration, still more than the preceding subgenera. There are but ten feet visible(3), mostly very short, and but slightly or nowise adapted to natation. Sometimes the body is nearly vermiform and cylindrical, the anterior

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(2) *Anthosoma Smithii*, Leach; Desmar., Consid., L, 3; *Caligus imbricatus*, Risso.

(3) There are probably two more, as in the preceding subgenera, but they are either indistinct or have such a peculiar form that they have not been recognized.

segment being merely somewhat widened and furnished with two projecting didactyle claws; sometimes, on account of two lateral expansions resembling lobes or wings behind the thorax, and of two posterior ovaries, it forms a small quadrilateral mass. This tribe is composed of two genera. In the first or the

DICHELESTIUM, Herm., Jun.

We observe a narrow elongated body, slightly dilated before, and composed of seven segments, the anterior of which—the thorax of Herm.—is wider than the others, rhomboidal, and formed of the head and a portion of the thorax united. It bears: 1, four short antennæ, of which the lateral are filiform and consist of several joints, and the intermediate project like little arms and are quadri-articulated, the last joint terminating in a didactyle claw; 2, an inferior, membranous, and tubular siphon; 3, three kinds of deformed palpi—two multifid feet?—on each side, placed on an eminence; 4, four prehensile feet, the two first of which consist of a thigh and leg terminated by various unequal and dentated hooks, and the others of an enlarged thigh terminated by a small but stout nail. The second and third segments are almost lunulated, each bearing a pair of feet formed of a single joint, terminated by two kinds of toes, dentated at the end. To the fourth segment is attached another pair of feet, the fifth and last, but having the form of simple, oval, divergent, and immovable vesicles, which Hermann presumes are rather ovaries than feet. This segment, as well as the next, is nearly square. The sixth is much longer, and cylindrical. The seventh and last is three times shorter, almost orbicular, flattened and terminated by two small vesicles. The eyes are not distinct.

Dichelestium sturionis, Herm., Jun. Mem. Apter. p. 125, V, 7, 8; Desmar., Consid. L, v. About seven lines long and one broad. The second segment is prolonged on each side into an obtuse papilla, and the four following are red in the middle, with whitish-yellow along the lateral margins. When viewed from above, the feet are not visible. This animal penetrates deeply into the skin and places itself on the osseous arches of the branchiæ, but without, as it appears, intruding upon their combs. Twelve of them were taken by Hermann from a single fish. Of this number, two or three, perhaps males, were one third shorter than the others, and had a curved body; one of the twelve lived three days. They are constantly whirling about, and with considerable vivacity. By means of their frontal claws they are enabled to cling with great tenacity.

NICOTHOE, Aud. and Edw.

These animals terminate the Crustacea, and are distinguished from all others of that class by their heteroclitical form. To the naked eye they seem nothing more than two lobes united in the form of a horse-shoe, which enclose two others. By the aid of glasses, however, we discover that the two large lobes are formed by the great expansion of the sides of the thorax, which resemble wings, are almost oval and thrown behind; that the two others are external ovaries or clusters of eggs, analogous to those of a female Cyclops, and inserted, one on each side, into the base of the abdomen by means of a short pedicle; and that the body of the animal is composed of the following parts: 1, a distinct head furnished with two separate eyes; two short, setaceous, lateral antennæ formed of eleven joints, each with a hair on the inner side; a mouth forming a circular aperture which acts as a cup, and accompanied on each side with—anterior feet—maxilliform appendages; 2, a thorax of four segments, with five pairs of feet beneath, the two anterior of which are terminated by a stout hook, and are bidentated on the inner side; the remaining eight being formed of one large joint, terminated by two nearly equal and cylindrical stems, each composed of three joints, and furnished with setæ: 3, a pointed abdomen of five annuli, the first and largest of which gives origin to the oviferous sacs; the last is terminated by two long hairs. The lateral expansion merely appears to be an excessive development of the fourth and last ring of the thorax. Within we may perceive two kinds of entrails originating from the median line of the body, which may be considered as cæca or divisions of the intestinal canal in a state of hernia. They are endowed with a very decided peristaltic motion. We have seen that the stomach of the Arguli also exhibits two cæca, which ramify in the wings of their shell, and it is possible that these thoracic expansions of the Nicothoes may be two analogous lobes(1).

Nicothoe astaci, Aud. and Edw. Ann. des Sc. Nat., 1826, XLIX, 1, 9. The only species known; it is about half a line long and three lines broad, the thoracic enlargement included. It is rose-coloured, paler on the oviferous sacs; the expansions yellowish. It adheres closely to the branchiæ of the Lobster, and penetrates deeply between the filaments of those organs. It is only found in small numbers, and on a few individuals. All the Nicothoes observed by these two naturalists were furnished with ovaries; it is probable that previously to fixing themselves on the branchiæ of the Lobster, and before their thoracic lobes have acquired their ordinary development, they can swim; that development, as is the case with the body of the Ixodes, may be the result of superabundant nutrition.

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(1) In this case, the genus may be approximated to the preceding one.

TRILOBITES.

According to Brongniart and various other naturalists, it is in the vicinity of the Limuli and other Entomostraca with numerous feet, that we should place these singular fossil animals, originally confounded under the common name of *Entomolithus paradoxus*, and now designated by that of Trilobites, of which an excellent monograph, enriched with good lithographic figures, has been published by that gentleman(1). By this hypothesis we have to admit as a positive or at least highly probable fact, the existence of locomotive organs, although, notwithstanding the most careful investigation, no vestige of them has been discovered(2). Presuming, on the contrary, that these animals were deprived of them, I thought that their natural position was in the neighbourhood of the Chitones, or rather that they constituted the original stock of the Articulata, being connected on the one hand with these latter Mollusca, and on the other with those first mentioned, and even with the Glomeres(3), to which some Trilobites, such as the Calymenes, appear to approximate, as well as to the Chitones, inasmuch as by contracting they could also become spherical. Since the publication of M. Brongniart's work, some naturalists have rejected his opinions and adopted mine, either wholly or in part; others still hesitate. Be this as it may, these animals appear to have been annihilated by some ancient revolution of our planet.

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(1) M. Eudes Deslongchamps, professor of the University of Caen, Count Rasoumowski, M. Dalman and other savans have since published new observations on these fossils. M. Victor Audouin, zealously advocating the opinion of Brongniart, has contested that published by me, in which I approximate them to Chiton. The great difficulty was to prove the existence of feet, and this he has not done. The application of his theory of the thorax of Insects to the Trilobites, appears to me so much the more doubtful, as, according to my view of the matter, the first annuli of the abdomen of Insects alone represent the thorax of the Crustacea Decapoda.

(2) M. Parkinson (Outlines of Oryctology) thinks he has perceived them, and suspects that they are unguiculated. See also the *Entomostracite granuleux* Brongn., Trilob., III, 6, Ann. des Sc. Nat. tome XV.

(3) First edition of the Règne Animal, tome III, p. 150, 151. There is no Branchiopoda known which can contract itself into the form of a ball. This character is peculiar to Typhis, Sphæroma, Tylos, and Armadillo among the Crustacea; and among the class of apterous Insects to Glomeris, a genus which is at the

The Trilobites, one heteromorphous genus excepted, that of Agnostus, have, like the Limuli, a large anterior segment in the form of an almost semicircular or lunated shield, followed by from about twelve to twenty-two segments(1), all transversal except the last, and divided by two longitudinal sulci into three ranges of parts or lobes, whence their name of Trilobites(2). Some naturalists call them *Entomostracites.*

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head of that class, and which leaves between it and the latter Crustacea a considerable hiatus. The Calymenes, with respect to this contractility, evidently approach these latter Insects, the Typhes and Sphæromæ; but it does not appear that the posterior extremity of their body is provided with lateral natatory appendages, a negative character which would remove them from the Sphæromæ, but approximate them to Armadillo, and particularly to Tylos, where the superior part of the thoracic segments is divided into three. The study of a well preserved specimen has convinced me that, like the Limuli, they had eyes placed against two prominences, and that the cornea was granulous or with facets. The non-existence of the superior antennæ also indicates a new affinity between these same Trilobites and the Limuli.

(1) The body of various Trilobites, and particularly of the Asaphi, seems to consist, exclusive of the shield, of twelve segments, well separated on the sides, and of another forming the post-abdomen, or a triangular or semi-lunar tail, whose divisions are superficial and do not cut its edges. In the Paradoxides, on the contrary, the lateral lobes terminate by well marked acute prolongations, and twenty-two of them can be distinctly counted. A species of Trilobite, mentioned by Count Rasoumowski in his memoir on fossils, Ann. des Sc. Nat. June, 1826, pl. xxviii, ii, which he presumes should constitute a new genus, is, in this respect, very remarkable. Its lateral lobes form very long thongs or slips tapering to a point. The feet of the pupæ of the Culices are elongated, flattened, inarticulated laminæ terminated by threads and folded on the sides. They are in a rudimental state, and may be analogous to the lateral divisions of this species of Trilobite, allied to the Paradoxides.

(2) The Squillæ, and various Amphipodous and Isopodous Crustacea have also several of their segments trisected by two impressed and longitudinal lines; but these lines are nearer to the edges and do not form deep sulci.

AGNOSTUS, Brongn.

The only genus where the body is semicircular or reniform. In all the other genera it is oval or elliptical, and exhibits the general characters above mentioned.

CALYMENE, Brongn.

The Calymenes are distinguished from all other Trilobites, by the faculty of contracting their body into a ball, and in the same manner as Sphæroma, Armadillo, and Glomeris, that is, by approximating the two inferior extremities of the body. The shield, as broad as it is long, or broader, is furnished, as in the Asaphi and Ogygiæ, with two oculiform prominences. The segments do not project beyond the sides of the body, and are united throughout; the body is terminated posteriorly by a sort of triangular and elongated tail. In

ASAPHUS, Brongn.

The oculiform tubercles seem to exhibit a sort of eye-lid, or are granulous; the species of tail which terminates the body posteriorly, is less elongated than in Calymene, and is either nearly semicircular, or in the form of a short triangle(1). In the

OGYGIA, Brongn.

The shield is longer than it is broad; its posterior angles are extended into a kind of spine. The oculiform tubercles exhibit neither eyelid nor granulations. The body is elliptical.

PARADOXIDES, Brongn.

The eye-like tubercles cease to exist, or are not apparent in this genus. The segments, or at least most of them, project beyond the sides of the body, and are free at their lateral extremity.

Such are the characters of the five genera established by M. Alexander Brongniart, which may be arranged in three principal groups: the *Reniformes*—AGNOSTUS; the *Contractiles*—CALYMENE; and the *Extensi*—ASAPHUS, OGYGIA and PARADOXIDES.

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(1) In the *Asaphus Brongniarti*, described and figured by M. E. Deslongchamps, the posterior angles of the shield, instead of being directed backwards as in the other species, are recurved.

For a description of the species and their localities, we refer the reader to the excellent work of this celebrated naturalist, who in his labours upon the fossil Crustacea, properly so called, or universally admitted as such, has availed himself of the talents of one of his most distinguished pupils, M. Desmarest, frequently referred to by us, not only with respect to this particular part of the science, but in relation to his work on the living Crustacea. Different naturalists have proposed various generic sections of these fossils; but being restricted to general considerations, I have adopted those presented to us by the best work hitherto produced on the subject.

CLASS II.

ARACHNIDES.

The Arachnides, which compose the second class of articulated animals provided with movable feet, are, as well as the Crustacea, deprived of wings, are not subject to changes of form or do not experience any metamorphosis, simply casting their skin. Their sexual organs also are at a distance from the posterior extremity of the body, and situated at the base of the abdomen, those of several males excepted: but they differ from them as well as from Insects in several particulars. Like the latter, the surface of their body presents apertures or transverse fissures called *stigmata*(1), for the introduction of air, but they are few in number—eight at most, and usually but two—and confined to the inferior portion of the abdomen. Respiration is also effected either by means of air-branchiæ, fulfilling the functions of lungs, that are contained in sacs of which these stigmata are the apertures, or by radiated tracheæ(2). The visual organs merely consist of ocelli, which, when numerous, are variously grouped. The head, usually confounded with the thorax, in place of the antennæ, has two articulated pieces in the form of small didactyle or monodactyle chelæ, improperly compared to the mandibles of Insects, and so denominated, moving in a contrary direction to the former, or from above downwards, still however co-operating in the business of manducation, and replaced in

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(1) A vague and improper appellation, for which we might substitute *pneumostoma*,—air-mouth,—or *spiraculum*.

(2) See general observations on Insects.

the Arachnides, where the mouth has the form of a siphon or sucker, by two pointed blades which act as lancets(1). A kind of lip—labium, Fab.—or rather ligula, produced by a pectoral prolongation; two jaws formed by the radical joint of the first segment of two small legs or palpi(2), or by an appendage or lobe of that same joint; a part concealed under the mandibles, called *langue sternale* by Savigny—description and figure of the *Phalangium copticum*—and composed of a projection in the form of a rostrum, produced by the union of a very small clypeus terminated by an extremely small triangular labrum, and of an inferior longitudinal carina, usually very hairy, are the parts, which, with the pieces termed mandibles, constitute with some modifications the mouth of most of the Arachnides. The pharynx(3) is placed before a sternal projection which has been considered as a lip, but which, from being placed directly behind the pharynx and having no palpi, is rather a ligula. The legs, like those of

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(1) *Chelicerœ*, or *forceps-antennœ:* the evident result of the comparison between them and the intermediate antennæ of various Crustacea, those of the Pæcilopoda particularly. It cannot then be said, strictly speaking, that the Arachnides are deprived of antennæ, a negative character, which, previous to us, had been exclusively attributed to them.

(2) They only differ from legs properly so called, by their tarsi, which are composed of a single joint, and are usually terminated by a small hook, resembling, in a word, the ordinary feet of the Crustacea. See our general observations on the first order. These jaws and palpi appear to correspond to the palpigerous mandibles of the Decapoda and to the two anterior feet of the Limuli. In Phalangium, the four following legs have a maxillary appendage at their origin, so that these four appendages are analogous to the four jaws of the preceding animals. I had described these parts, long before the publication of Savigny's memoirs on the invertebrate animals, in a monograph of the species of this genus proper to France. From these and the preceding observations it is evident that the composition of these animals is easily reduced to the same general type which characterizes all articulated animals with articulated feet. The Arachnides are not then a sort of acephalous Crustacea, as stated by this savant, usually so exact in his anatomical observations, of which, unfortunately for the sciences, he has become the victim.

(3) Although Savigny admits of two orifices, neither Straus nor myself can find but one; it must have been the effect of an optical illusion, arising from the fact of his having only perceived the lateral extremities of the fissure, its middle being concealed by the tongue with which its anterior face is thickened in its mediate portion.

insects, are commonly terminated by two hooks, and even sometimes by one more, and are all annexed to the thorax, or rather cephalo-thorax, which, except in a small number, is only formed of a single segment and is frequently intimately united to the abdomen. This latter part of the body is soft, or but slightly defended, in most of them.

With respect to their nervous system, the Arachnides are greatly removed from the Crustacea and Insects; for if we except the Scorpions, which from the knots or joints forming their tail have some additional ganglions, the number of these enlargements of the two nervous cords is never more than three, and even in the latter, all counted, it never extends beyond seven.

Most of the Arachnides feed on Insects which they either seize alive, or to which they adhere, abstracting their fluids by suction. Others are parasitical, and live on vertebrated animals. Some of them however are only found in flour, on cheese, and even on various vegetables. Those which live on other animals frequently multiply there to a great extent. Two of the legs, in some species, are only developed by a change of the tegument, and in general it is not until the fourth or fifth change of skin that these animals are capable of propagation(1).

Division of the Arachnides into orders.

Some have pulmonary sacs(2), a heart with very distinct vessels, and six or eight simple eyes. They compose our first order, or that of the PULMONARIÆ.

The others respire by tracheæ, and have no organs of circulation, or if they have, the circulation is not complete. The tracheæ are divided near their origin into various branches, and do not, as in Insects, form two trunks which run parallel to each other throughout the whole length of the body and receive air from various points by means of numerous stigmata. Here, but two, at most, are distinctly visible, and they are situated near the base of the abdomen(1). The number of simple eyes is at most but four. They constitute our second and last order, or that of the TRACHEARIÆ.

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(1) We have seen, according to the observations of Jurine, Jun., that they only acquire this faculty after their sixth change. This fact is also applicable to the Lepidoptera, and probably to other insects that frequently cast their skin, for caterpillars usually change it four times before they enter into the state of a chrysalis which is a fifth. The insect does not become perfect until after another, so that it changes its skin six times.

(2) Sacs containing air-branchiæ, or fulfilling the functions of lungs, and distinguished by me from the latter by the name of *pneumo-branchiæ*.

ORDER I.

PULMONARIÆ(2).

We here find a well marked circulating system and pulmonary sacs, always placed under the abdomen, announced externally by transverse openings or fissures (stigmata), of which there are sometimes eight, four on each side, and at others four, or even two. The number of simple eyes is from six to eight(3), while in the following order it never exceeds four, and is most generally but two; sometimes they are hardly perceptible, or even annihilated. The organ of respiration is formed of little laminæ. The heart is a large vessel which extends along the back, and gives off branches on each side and anteriorly(1). There are always eight legs. The head is always confounded with the thorax, and presents at its anterior superior extremity two mandibles—so called by authors, the *cheliceræ* or *antenne-pinees*, Latr.—terminated by two fingers, one of which is movable, or by a single one resembling a hook or claw that is always movable(2). The mouth is composed of a labrum(3), of two palpi, sometimes resembling arms or claws, of the two or four jaws, formed, when there are but two, by the radical joint of these palpi, and moreover, when there are four, by the same joint of the first pair of feet, and of a ligula consisting of one or two pieces(4). If we base our arrangement on the progressive decrease of the number of pulmonary sacs and stigmata, the Scorpions where it is eight, while in the other Arachnides it amounts to but four or two, should form the first genus of this class, and consequently our family of the Pedipalpi should precede that of the Araneides(5). But the latter Arachnides are in a manner insulated by their male organs of generation, by the claw or hook of their frontal mandibles, by their pediculated abdomen and its spinning apparatus, and by their habits; besides this, the Scorpions appear to form a natural transition from the Arachnides Pulmonariæ to the family of the Pseudo-Scorpiones, or the first of the following order. We will therefore commence, as we have said, with the Arancides or spinners.

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(1) The Pycnogonides exhibit no stigmata, and seem, in this respect, to approach the last of the Crustacea, such as Dichelestium, Cecrops, and other Siphonostomous Entomostraca. Savigny thinks they have a closer affinity to the Læmodipoda, from which, however, they are greatly removed, by the organization of the mouth as well as by their eyes and feet. We still believe, however, from the ensemble of their characters, that they rather belong to the class of Arachnides, and that they approximate particularly to *Phalangium* with which various authors have arranged them. We also think that they may respire by the surface of their skin. At all events, we must await the results of anatomical investigation, before we can decide.

(2) UNOGATA, Fab.

(3) The *Tessarops* of Rafin., according to him, has but four eyes; I presume, however, that the lateral ones escaped his notice. See the subgenus *Eresus*.

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(1) According to Marsel de Serres, Mémoire sur le Vaisseau Dorsale des Insectes, the blood, in the Araneides and Scorpions, is first directed to the organs of respiration, and thence proceeds to various parts of the body through particular vessels. Judging, however, from the affinity of these animals to the Crustacea, the circulation would seem to be effected in the contrary direction. See the Memoir of Treviranus on the Anatomy of Spiders and Scorpions.

(2) These parts are formed of a first very large and ventricose joint, one of whose superior angles, when the chelæ are didactyle, forms the fixed finger, and of a second joint, that which forms the opposite and movable finger or the hook, when there is but one finger. In the latter case, as with several of the Crustacea, I will employ the term claw.

(3) See our general observations on the class.

(4) That of the Scorpions appears to be composed of four pieces, forming an elongated and pointed triangle, directed forwards; the two lateral ones however are evidently formed by the first joint of the two anterior feet, and may be considered as two jaws analogous to the first. We see by Mygale, Scorpio, &c. that the palpi are divided into six joints, of which, in the other Araneides, the first or radical one, is anteriorly and internally dilated to form the maxilliform lobe. Even this lobe, in some species, is articulated at base, and thus becomes a maxillary appendage of this same joint. Exclusive of this joint, the palpus consists of but five, and such is the most usual mode of supputation. In the Scorpions the movable finger of the forceps, as in that of the Crustacea, forms the sixth joint.

(5) In my Fam. Nat. du Règne Animal, I begin with the Pedipalpi. M. Leon Dufour also thinks that the Scorpions should come first.

FAMILY I.

ARANEIDES.

This family is composed of the genus Aranea, Lin., or the Spiders. They have palpi resembling little feet, without a forceps at the end, terminated at most in the females by a little hook, and the first joint of which, in the males, gives origin to various and more or less complicated sexual appendages(1). Their frontal cheliceræ (the mandibles of authors) are terminated by a movable hook, flexed inferiorly, underneath which, and near its extremity, which is always pointed, is a little opening, that allows a passage to a venomous fluid contained in a gland of the preceding joint. There are never more than two jaws. The ligula consists of a single piece, is always external and situated between the jaws, and either more or less square, triangular or semicircular. The thorax(2) usually marked with a depression in the form of a V, indicating the space occupied by the head, consists of a single segment, posteriorly to which, by means of a short pedicle, is suspended a movable and usually soft abdomen; it is always furnished, under the anus, with from four to six closely approximated cylindrical or conical, articulated mammillæ with fleshy extremities, which are perforated with numberless small orifices(1) for the passage of silky filaments of extreme tenuity proceeding from internal reservoirs. The legs, identical as to form, but of different sizes, are composed of seven joints, of which the two first form the hip, the third the thigh, the fourth(2) and fifth the tibia, and the two others the tarsus: the last is terminated by two hooks usually pectinated, and in several by one more, which is smaller and not dentated. The intestinal canal is straight, consisting of a first stomach composed of several sacs, and then of a second stomach or dilatation surrounded with silk. According to the observations of M. Leon Dufour—Ann. des Sc. Phys. VI—it occupies the greater part of the abdominal cavity, and is immediately enveloped by the skin. It is of a pulpy consistence, and is formed of granules(3), whose individual excretory ducts unite in several hepatic canals, which pour the secreted matter into the alimentary tube. In the middle of its superior surface is a depressed line, where the heart is lodged, and which divides that organ into two equal lobes. Its form, like that of the abdomen, varies according to the species; thus in the *Epeira sericea* its contour is festooned. In this subgenus, as in the *Lycosa tarentula*, its surface is covered with a whitish coat split into areolæ, which, in several species, are easily perceived through the glabrous skin; they may be seen obeying the impulse communicated to them by the systole and diastole of the heart. Both sexes frequently eject from the anus an excrementitious fluid, part of which is milk-white, and the remainder black as ink.

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(1) From all the observations that have been made on the mode of copulation of the Araneides, I am still inclined to believe that these appendages are the genital organs. I have vainly sought for particular organs on the base of the abdomen of a large male Mygale preserved in spirits. We are not always to judge from analogy; for the sexual organs in the female Glomeris, Julus, and other Chilognatha, are situated near the mouth, a fact of which no second example is to be found.

(2) The term *cephalo-thorax*, would be more strict and proper; not being in use, however, I have thought it best to avoid it; neither will I employ that of *corselet*, although generally admitted, because, with respect to the Coleoptera, Orthoptera, &c. it only applies to the prothorax or first thoracic segment.

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(1) These holes are pierced in the last segment, which is frequently retracted. If it be strongly compressed, very small mammillæ, (at least in some species,) perforated at the extremity, are protruded—they are the true fusi or spinning apparatus. Some naturalists think that the two smaller mammillæ, situated in the middle of the four exterior ones, furnish no silk.

(2) This joint or the first of the tibia is a kind of patella.

(3) The liver of the Scorpions is composed of pyramidal and fasciculated lobules, a circumstance which seems to announce a more advanced degree of organization.

The nervous system is composed of a double cord occupying the median line of the body, and of ganglions which distribute nerves to the various organs. M. Dufour has not been able to determine the number and disposition of these ganglions, but from the figure of this system given by Treviranus—Veber deninnern, bau des Arachniden, tab. V, fig. 45—there are but two. The observations of the latter will also supply the want of those relative to the organ of the circulation by M. Dufour, which, according to him, appears to consist of a simple dorsal vessel, as well as with respect to the testes and spermatic vessels, on which he is totally silent.

The dorsal region of the abdomen in several Araneides, those especially which are glabrous or but slightly pilose, exhibits depressed points varying both in number and arrangement. M. Dufour has ascertained that these little orbicular depressions are caused by the insertion of filiform muscles, which traverse the liver, and which he has also observed in the Scorpions.

The one or two pairs of pulmonary sacs are indicated externally by as many yellowish or whitish spots near the ventral base, and immediately after the segment which by means of a fleshy thread unites the abdomen with the thorax. Each pulmonary bursa is formed by the superposition of numerous, triangular, white, and extremely thin leaflets, which become confluent round the stigmata, and whose number exactly equals that of the pulmonary sacs. When there are four, a sort of fold or annular vestige found even in those where there are but two, and placed directly behind them, forms a line that separates the two pairs.

The females have two very distinct ovaries, lodged in a species of capsule formed by the liver. In an unfecundated state they appear to be composed of a spongy, flaky kind of tissue, formed by the agglomeration of rounded, and scarcely visible corpuscles, which are the germs of eggs. As the results of fecundation become more apparent, the cluster formed by these ova(1) becomes less compact, and they are seen to be laterally inserted on several canals. Their great analogy to the ovaries of the Scorpions induces the same observer to presume that they form meshes terminating in two distinct oviducts, which open into a common vulva. The figure of the latter varies; sometimes it is a longitudinal bilabiated slit, as in the *Micrommata argelasia;* sometimes it is protected by an elongated operculum with a caudiform termination, as in the *Epeira diadema;* and at others resembles a tubercle.

With respect to the simple eyes, or ocelli, he remarks, that they shine in darkness like those of Cats, and that the Araneides most probably enjoy the faculty both of nocturnal and diurnal vision.

The abdomen becomes so putrid and decomposed after death, that its colours and even its form are soon destroyed. M. Dufour, by means of a rapid desiccation, the mode of which he points out, has succeeded in remedying this evil to a great degree.

The silk, according to Reaumur, is first elaborated in two little reservoirs, shaped like tears of glass, placed obliquely, one on each side, at the base of six other reservoirs, resembling intestines, situated close to each other, flexed six or seven times, proceeding from a little beneath the origin of the abdomen, and terminating in the papillæ by a very slender thread. It is in these last mentioned vessels that the silk acquires a greater degree of firmness and other properties peculiar to it; they communicate with the preceding ones by branches, forming a number of geniculate turns, and then various pieces of net-work(2). The newly spun filaments, when first drawn from the mammillæ, are adhesive, and a certain degree of desiccation or evaporation is required to fit them for their destined purposes. When the temperature is propitious, however, a single instant is sufficient, as the animal employs them the moment they escape from the apparatus. Those white and silky flocculi that may be observed floating about in spring and autumn in foggy weather, vulgarly termed in France *fils de la Vierge*, are certainly produced—as we have satisfactorily ascertained by tracing them to their point of origin—by various young Araneides, those of the Epeiræ and Thomisi particularly; they are mostly the larger threads which are intended to afford points of attachment to the radii of the web, or those that compose the chain, and which, becoming more ponderous by the access of moisture, sink, approach one another, and finally form little pellets: we frequently observe them collected near the web commenced by the Spider, and in which it resides.

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(1) For their development and that of the fœtus, see the admirable work of Hérold.

(2) See Treviranus, on the same subject.

It is also very probable that many of these young animals not having as yet a sufficient supply of silk, limit their structure to throwing out simple threads. It is, I think, to the young Lycosæ that we must attribute those which intersect the furrows of ploughed grounds, whose numbers are rendered so apparent by the reflection of light after sunrise. By chemical analysis, these *fils de la Vierge* exhibit the same characters as the web of the spider:—they are not then formed in the atmosphere, as, for want of proper observation, *ex visu*, that celebrated naturalist, M. Lamarck, has conjectured. Gloves and stockings have been made with this silk; but it was found impossible to apply the process on a large scale, and as it is subject to many difficulties, is rather a matter of curiosity than utility. This substance, however, is of much greater importance to the little animals in question. With it, the sedentary species, or those which do not roam abroad in search of their prey, weave webs(1) of a more or less compact tissue, whose form and position vary according to the peculiar habits of each of them, and that are so many snares or traps, where the insects on which they feed become entangled, or are taken. No sooner is one of them arrested there by the hooks of its tarsi, than the Spider, some times placed in the centre of his net, or at the bottom of his web, or at others lying in ambush in a peculiar domicil situated near and in one of the angles, rushes towards his victim and endeavours to pierce him with his murderous dart, distilling into the wound a prompt and mortal poison; should the former resist too vigorously, or should it be dangerous to the latter to approach it, he retreats, waiting until it has either exhausted its powers by struggling, or become more entangled in the net; but should there be no cause of fear, he hastens to bind it by involving the body in his silken threads, with which it is sometimes completely enveloped.

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(1) Those of some exotic species are so strong, that small birds are entangled in them; they even oppose a certain degree of resistance to man.

Lister says that Spiders dart their threads in the same way that the Porcupine darts his quills, with this difference, however, that in the latter, according to the popular belief, the spines are detached from the body, whereas in the former, these threads, though propelled to a considerable distance, always remain connected with it. The possibility of this has been denied. Be it as it may, we have seen threads issuing from the mammillæ of several Thomisi form straight lines, and when the animals moved circularly, producing movable radii. A second use to which this silk is applied by all female Araneides, is in the construction of the sacs destined to contain their eggs. The texture and form of these sacs are variously modified, according to the habits of the race. They are usually spheroidal; some of them resemble a cap or tymbal, others are placed on a pedicle, and some are claviform. They are sometimes partially enveloped with foreign bodies, such as earth, leaves, &c.; a finer material, or sort of tow or down, frequently surrounds the eggs in their interior, where they are free or agglutinated and more or less numerous. As they are voracious animals, the males, in order to avoid a surprise and to prevent themselves from falling victims to their premature desires, approach their females in the nuptial season, with the greatest circumspection and mistrust. They cautiously and repeatedly touch them, and frequently for a long time before they yield to their wishes, and when this is the case they quickly and repeatedly apply the extremity of their palpi to the inferior surface of the abdomen, protruding at each time and as if by a spring, the fecundating organ contained in the button formed by the last joint of those palpi, and insinuate it into a sub-abdominal slit, near the base and between the respiratory orifices; after a moment's interval the same act is repeatedly performed. Such is the mode of copulation of a small number of species belonging to the Orbitelæ. It is impossible to avoid feeling the most lively interest in reading what has been written upon this subject by that learned naturalist, who of all others has most profoundly studied these animals, the celebrated Walckenaer, member of the Acad. des Inscriptions et Belles-lettres. The apparatus of the male organs of generation, or at least of what are considered as such, is usually highly complicated and very various; it consists of scaly pieces, more or less hooked and irregular, and of a white fleshy body, on which sanguineous looking vessels are sometimes perceptible, which is considered as the fecundating organ, properly so called; but in the Arachnides with four pulmonary sacs, and in some belonging to the division where there are but two, the last joint of the palpi of the males only exhibits a single horny piece in the form of a hook or ear-picker, without the smallest visible opening. Although Muller and others were mistaken when they placed the male organs of certain Entomostraca upon two of their antennæ, it is very certain that the parts considered as analogous to them in the Araneides, are very different from those observed on the antennæ of those Crustacea, and that if we refuse to admit of their exercising this function, it is impossible to conceive of their use(1).

According to the experiments of Audebert, who has given us a history of the Monkeys worthy of the talents of that great painter, it is certain that a single fecundation is sufficient for several successive generations, but that with them, as with all Insects and other analogous classes, the ova are sterile without a union of the sexes. Their nuptial season in France lasts from the latter end of summer till the beginning of October. The ova first laid are frequently hatched before the termination of autumn: the others remain in statu quo during the winter. The females of certain species of Lycosa have been observed to tear open the egg-sac when the young ones were about to issue from the ovum. The latter then mount on the back of their mother, where they remain some time. Other female Araneides carry their cocoons under the abdomen, or remain near them and watch them. The two posterior feet of some of the young ones are not developed until several days after they have been hatched. Some, during the same period, live together, and appear to spin in common. Their colouring is then more uniform, and the young naturalist may easily err in multiplying their species. One of our collaborators for the Encyclopedie Methodique, M. A. Lepelletier of Saint-Fargeau, has observed that these animals, as well as the Crustacea, possess the faculty of reproducing a lost limb.

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(1) They must at all events be organs of excitation.

I have ascertained that a single wound from a moderate sized Araneid will kill our common Fly in a few minutes. It is also certain that the bite of those large Araneides of South America, which are there called Crab-Spiders, and are placed by us in the genus Mygale, kills the smaller vertebrated animals, such as Humming-Birds, Pigeons, &c., and produces a violent fever in Man; the sting of some species in the south of France has even occasionally proved fatal. We may therefore, without believing all the fabulous stories of Baglivi and others respecting the bite of the Tarantula, mistrust the Araneides, and particularly the larger ones.

Various insects of the genus Sphex, Lin., seize upon these Spiders, pierce them with their sting, and transport them into holes where they have deposited their eggs, as a source of food for their young. Most of them perish in winter, but there are some which live several years—such are the Mygales, the Lycosa, and probably several others. Although Pliny states that the genus *Phalangium* is unknown in Italy, we still presume that these latter Araneides and other large species which weave no web, as also the Galeodes and Solpugæ, are the animals they collectively designated by that name, and of which they distinguished several species. Such also was the opinion of Mouffet, who, in his Theat. Insect., p. 219, has figured a Lycosa or Mygale, of the island of Candia, as a species of Phalangium.

Lister was the first and most successful observer of the Spiders, whose habits he was enabled to study; those of Great Britain laid the foundations of a natural arrangement, of which most of those that have been since published are mere modifications. The more recent discovery of species peculiar to hot climates, such as the *Araignee maçonne* described by the abbé Sauvages, and some others, the use of the organs of manducation introduced into the system by Fabricius, a more exact study of the general disposition of the eyes, and of their respective sizes, with that of the relative length of the legs, have all contributed to extend this classification. Walckenaer has entered into the most minute of these details, and it would be a difficult matter to discover a species that could not find its place in some one of his divisions. One character, however, existed, the application of which had not been made general: I allude to the presence or absence of the third terminal hook of the tarsi. Savigny, so far as this is concerned, has given us a new method, of which, however, I have only seen a simple sketch(1).

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(1) See Walck., Faun. Franc., note to genus *Atta*.

We knew nothing of the observations of M. Savigny on the Spiders, which accompany the plates of Nat. Hist. of the great work on Egypt, until long after our article relative to the same animals was printed.

That gentleman—Hist. Nat. ut sup.—establishes the following genera in the family of the Araneides: 1. Ariadne, near that of Segestria, having but six eyes, of which the two intermediate posterior ones are further forwards;—2. Lachesis, near Drassus, but with the hooks of the Cheliceræ, (*forcipules*, Savign.,) very small;—3. Erigone, also allied to Drassus as well as to Clubiona; thorax very high before; second joint of the palpi spinous, and dilated into angle or tooth at the extremity;—4. Hersilia, allied to Agelena and Theridion of Walckenaer; feet long and slender, the superior nails bidentate; eyes united on an eminence, arranged in two transverse lines, and curved backwards; two very long fusi

M. Leon Dufour, who has published many excellent memoirs on the anatomy of Insects, who has especially studied those of Valencia, among which he has detected several new species, and to whose labours the science of Botany is not less indebted, has paid particular attention to the respiratory organs of spiders, and it is from him that we have taken our divisions, which consist of those that have four pulmonary sacs—with as many external stigmata, two on each side, and closely approximated—and of such as have but two(1). The first, which embraces the order of the Theraphosæ of Walckenaer, and some other genera of the one he collectively designates by the name of Spiders, acccording to our method form but the single genus

MYGALE.

Their eyes always situated at the anterior extremity of the thorax, and usually, closely approximated; feet and cheliceræ robust; copulating organs of the males always salient and frequently very simple. Most of them have but four fusi, of which the two lateral or external, situated somewhat above the others, are longest, and consist of three segments, exclusive of the prominence that forms their peduncle. They weave silken tubes in which they reside, and which they conceal either in holes excavated by them for that purpose, or under stones, bark of trees, or between leaves.

The Theraphosæ of Walckenaer will form a first division, the characters of which are: 1. Four(2) fusi, of which the two that are intermediate and inferior, are usually very short, and the two that are exterior, very salient; the hooks of the chelæ doubled underneath, or along their carina or inferior edge, and not on the inner side of their internal face, or upon it; eight eyes always, usually grouped on a little eminence, three on each side, forming a

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forming a tail;—5. ARACHNE, which does not appear to us to differ from Angelena;—6. ARGYOPES, Epeiræ whose anterior, lateral eyes are much smaller than the others;—7. ENYO, fifth family of the Theridion, Walck.;—8. OCYALE, second family of the Dolomedes, Id.

(1) Section of the Territelæ of our first edition.

(2) I have perceived, in the Atypi, vestiges of two other mammillæ, those which, in the Spiders of the ensuing division, are placed between the four exterior ones, and are, there, very visible; as they are here but scarcely apparent, I have not thought it requisite to notice them.

reversed triangle, and the two superior ones approximated; the remaining two arranged transversely between the preceding.

The fourth pair of legs are the longest, and then the first; the third is the shortest.

Here the palpi are inserted into the superior extremity of the jaws; so that they appear to consist of six joints, the first of which, narrow and elongated, with the internal angle of the superior extremity salient, fulfils the functions of a jaw. The ligula is always small and nearly square. The last joint of the palpi of the males is short, has the form of a button, and bears the organs of generation at its extremity. The two anterior legs of the same sex have a stout spine or spur at their inferior extremity. Such are the characters of the

MYGALE, Walck.,

Or the true Mygales. In some of them we find no transverse series of horny and movable spines or points, resembling the teeth of a rake, at the superior extremity of their cheliceræ immediately above the insertion of the claw or hook which terminates them. The hairs which decorate the under part of their tarsi, form a thick and broad brush, projecting beyond the hooks, and usually concealing them. The male organs of generation consist of a single scaly piece, terminated by an entire point, or neither emarginated nor divided; sometimes it is formed like an ear-pick—*M. de la Blond*, Lat.—usually, however, it is globular inferiorly, then becomes narrow, terminates in a point, and forms a kind of arcuated hook.

This division is composed of the largest species of the family, some of which, when at rest, cover a circular space of from six to seven inches in diameter; they sometimes seize upon Humming-birds. They establish their domicil in the clefts of trees, under the bark, in the fissures of rocks, or on the surface of leaves of various plants. The cell of the *Mygale avicularia* has the form of a tube, narrowed into a point at its posterior extremity. It consists of a white web, of a close, very fine texture, semi-diaphanous, and resembling muslin. One of them, presented to me by M. Goudot, when unrolled, was about two decimetres in length, and six centimetres in breadth, measured across its greatest transversal diameter. The cocoon of the same species was of the figure and size of a large walnut. Its envelope, consisting of the same material as that of its domicil, was formed of three layers. It appears that the young are hatched in it, and undergo their first change of tegument there.

The naturalist just mentioned, stated to me, that he had taken a hundred of them from a single cocoon(1).

This Mygale—*Aranea avicularia*, L.; Kléem. Insect. XI, and XII, the male—is about an inch and a half long, blackish, and extremely hairy; the extremity of the feet and palpi, and the inferior pili of the mouth reddish. The genital organ of the male is hollow at base, and terminates in an elongated and very acute point.

South America and the Antilles produce other species, called by the French colonists *Araignées-crabes*. Their bite is reputed to be dangerous. A very large species—*M. fasciata;* Seb., Mus., I, lxix, i; Walck., Hist. of Spiders, IV, i, the female —is also found in the East Indies. A species, nearly as large as the avicularia, inhabits the Cape of Good Hope. Another of the same division—*M. Valentina*—was discovered in the sandy and desert districts of Moxenta, in Spain, by M. Dufour, who has described and figured it in the Ann. of the Phys. Sciences, Brussels, vol. V. Walckenaer has also described a second species from that peninsula which has two prominences above its respiratory organs. These two latter species form a particular group, characterized by the hooks of the tarsi, which are salient or exposed(2).

In the following Mygales(3), the superior extremity of the first joint of the cheliceræ presents a series of spines, articulated and movable at base—according to the observations of Dufour—and forming a sort of rake.

The tarsi are less pilose underneath than in the preceding division, and their hooks are always exposed. The males of one species, the only ones I have seen, have more complicated organs of generation than those of the preceding division. The principal and scaly piece incloses a peculiar, semiglobular body, terminating in a bifid point, in an inferior cavity(4).

These species, in the dry and mountain districts of the south of Europe and of some other countries, excavate subterraneous galleries, which are frequently two feet in depth, and so extremely tortuous, that, according to Dufour, it is frequently impossible to trace them. At the mouth, they construct a movable operculum with earth and silk, fixed by a hinge, which, from its form, nicely adjusted to the aperture, its inclination, its weight, and the superior position of the hinge, spontaneously shuts, and completely closes the entrance of their habitation, forming a kind of trap-door, which is scarcely distinguishable from the surrounding earth. Its inner surface is lined with a layer of silk, to which the animal clings, in order to keep its door shut and prevent intruders from opening it. If it be slightly raised, it is a sure indication that the owner is within. Unearthed by laying open the gallery front of the entrance, it becomes stupified, and allows itself to be captured without resistance. A silken tube, or the nest properly so called, lines the inside of the gallery. M. Dufour thinks that the males never excavate. Independently of his having found them under stones only, they do not seem to him so well prepared with organs adapted to such work(1). Without deciding upon this point, we presume, with him, that the *Mygale carminans* of France—Nouv. Dict. d'Hist. Nat., art. MYGALE—is merely the male of the following species: Walckenaer, however, doubts it.

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(1) See my memoir on the habits of the Avicularia in the Ann. du Mus. d'Hist. Nat. VIII, p. 456.

(2) For details concerning these and the following species, as well as for the other genera of this family, see the corresponding articles in the Nouv. Dict. d'Hist. Nat., where we treat of them at length.

(3) The genus CTENIZA, Lat., Fam. Nat. du Règne Animal.

(4) On this point I am contradicted by M. Dufour. I was compelled again to examine the fact, and have convinced myself that I was not mistaken. It is possible the specimens he examined did not present this character.

M. cæmentaria, Lat.; *Araignée maçonne*, Sauvag., Hist. de l'Acad. des Sc., 1758, p. 26; *Araignée-mineuse*, Dorthés., Trans. Lin. Soc. II, 17, 8; Walck., Hist. des Aran., fasc. III, x; Faun. Franç., Arach., II, 4; Dufour, Ann. des Sc. Phys., V, lxxiii, 5. The female Mason Spider, as it is called, is about eight lines in length, of a reddish colour, verging on a brown more or less deep; edges of the thorax paler. The cheliceræ are blackish, each one furnished above, near the articulation of the hook, with five points, of which the internal is the shortest. The abdomen is of a mouse-grey, with streaks of a darker hue. The first joint of all the tarsi is furnished with small spines. The hooks of the last have a spur at their base, and a double range of acute teeth. The mammillæ are but slightly prominent. According to Dufour—Ann. des Sc. Phys., V, lxxiii, 4—the supposed male, of which I have made a species, *M. cardeuse*, differs from the preceding individual in the greater length of its feet, in the hooks of the tarsi, which are twice the number of the other, but have no spurs, and in the diminished length of its mammillæ. A more apparent character may be found in the stout spine, which terminates, inferiorly, the two anterior tibiæ. This Mygale is found in the southern departments of France situated on the borders of the Mediterranean, in Spain, &c.

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(1) See his excellent memoir entitled, "Observations sur quelques Arachnides Quadripulmonaires."

M. fodiens, Walck., Faun. Franç., Arach., II, 1, 2; *M. Sauvagesii*, Dufour, Ann. des Sc. Phys., V, lxxiii, 3; *Aranea Sauvagesii*, Ross. The female is somewhat larger than that of the preceding species, and of a light reddish-brown, without spots. The exterior fusi are long. The four anterior tarsi are alone furnished with small spines; all have a spur at the end, and their hooks have but a single tooth, situated at their base. The cheliceræ are stouter and more bent than those of the Cæmentaria; the teeth of the rake are rather more numerous, and there are two ranges of teeth under the first joint. The male is unknown. This species is found in Tuscany and Corsica. There is a small clod of earth in the Museum d'Hist. Nat. of Paris, in which are four of its nests, forming a regular quadrilateral figure.

M. Lefèvre, who has made so many sacrifices to the science of Entomology, has discovered a new species of Mygale in Sicily, the entire body of which is of a blackish brown. The extremity of the anterior tibiæ of the male does not exhibit that stout spine which appears to be peculiar to individuals of the same sex, in the other Mygales.

Another species is found in Jamaica—*M. nidulans*—figured, together with its nest, by Brown in his Nat. Hist. of Jamaica, pl. xliv, 3.

There, the palpi are inserted into an inferior dilatation of the external side of the jaws, and consist of but five joints. The ligula, at first very small—Atypus—lengthens, and then advances between the jaws, and this character becomes general. The last joint of the palpi, in both sexes, is elongated, and pointed near the end. There is no spur to the extremity of the anterior tibiæ of the males.

ATYPUS, Lat.—*Oletera*, Walck.

The Atypi have a very small ligula almost covered by the internal portion of the base of the jaws, and closely approximated eyes grouped on a tubercle.

Atypus Sulzeri, Lat., Gener. Crust. et Insect., I, v, 2, the male; Dufour, Ann. des Sc. Phys., V, lxxiii, 6; *Aranea picea*, Sulz.; *Olétère atype*, Walck., Faun. Franç., Arach., II, 3. Body entirely blackish, and about eight lines in length. The thorax is nearly square, depressed posteriorly, inflated, widened, and broadly truncated anteriorly, presenting an appearance very different from that of the same part in the Mygales. The chelicerae are very stout, and underneath the claw and at its base is a little eminence resembling a tooth. The last joint of the palpi of the male is pointed at the end. From the genital organ arises, inferiorly, a little squamous semi-diaphanous piece, widened and unequally bidentated at the end, with a small seta or cirrus at one of its extremities. This species excavates a cylindrical gallery in sloping grounds covered with grass; in this gallery, seven or eight inches in length, horizontal at first and then inclined, it weaves a tube of white silk of the same form and dimensions. The cocoon is fastened with silk by both ends to the bottom of the gallery. It is found in the environs of Paris and Bourdeaux; M. Basoches has observed a variety near Séez, which is always of a light brown.

M. Milbert has discovered another species—*Atypus rufipes*—near Philadelphia, which is entirely black, with fulvous feet.

ERIODON, Lat.—*Missulena*, Walck.

The Eriodons differ from the Atypi in their elongated, narrow ligula advancing between their jaws, and in their eyes, which are scattered over the anterior part of the thorax.

The only species known—*Eriodon occatorius*, Lat.; *Missulena occatoria*, Walck., Tabl. des Aran. pl. II, ii, 12—is an inch long, blackish, and peculiar to New Holland, where it was discovered by MM. Péron and Lesueur(1).

In our second and last division of the quadripulmonary Spiders or Mygales, we find characters common to Eriodon, such as the ligula being prolonged between the jaws, and the palpi consisting of five joints; but the claws of the chelicerae are folded over their inner face, there are six fusi, their first pair of legs is the longest and not the fourth, and the third is always the shortest. Some of them have but six eyes. The number of pulmonary sacs will not allow us to remove the subgenera of this division from the preceding ones, and as they conduct us to Drassus, Clotho, and Segestria, subgenera with but two pulmonary sacs, the natural order will not permit us to pass from the Mygales to the Lycosæ and other hunting or wandering Spiders. The Mygales are true tapissières—or true spiders which line their galleries with silk—and in fact, it was in this division that the Aranea avicularia of Linnæus was formerly placed.

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(1) In the first memoir of M. Dalman upon the Insects found in amber, that celebrated naturalist mentions (p. 25) a Spider which, it appeared to him, should be made the type of a new genus (Chalinura). The eyes are placed on a very high anterior tubercle, four of them, of which the two anterior are very large and approximated, occupying the centre. The external fusi are much elongated. From these characters it would seem that this spider approaches Mygale or some other analogous genus.

This second division comprises the two following subgenera.

DYSDERA, Lat.

But six eyes arranged in the figure of a horse-shoe, the opening in front; the chelicerae very stout and projecting; jaws straight and dilated at the insertion of the palpi(1).

FILISTATA, Lat.

Eight eyes grouped on a little eminence at the anterior extremity of the thorax; the chelicerae small; the jaws arcuated on the outer side, and surrounding the ligula(2).

We now pass to Araneides with but one pair of pulmonary sacs, and as many stigmata. They all have palpi formed of five joints, inserted into the external side of the jaws near their base, and most frequently in a sinus; a ligula extending between them, either nearly square, triangular or semicircular, and six fusi at the anus. The last joint of the palpi, in the males, is more or less ovoid, and usually encloses, in an excavation, a complicated and varied organ of copulation; it is rarely—Segestria—exposed.

With the exception of a few species, which enter into the genus Mygale, they compose that of

ARANEA, Lin.—*Araneus* of some authors.

A first division will comprehend the ARANEÆ SEDENTARIÆ, or sedentary spiders. They make webs, or throw out threads to ensnare their prey, and always remain in these traps, or their vicinity, as well as near their eggs. Their eyes are approximated anteriorly and are sometimes eight in number, of which four or two are in the middle and two or three on each side, and sometimes six.

Some, which, from the circumstance of their always moving forwards, we term the RECTIGRADÆ, weave webs and are stationary;

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(1) *Dysdera erythrina*, Lat.; Walck., Tab. des Aran., V, 49, 50; Dufour, Ann. des Sc. Phys. V, lxxiii, 7; *Aranea rufipes*, Fab.;—*Dysdera parvula*, Dufour, Ib.

(2) *Filistata bicolor*, Lat.; Walck., Faun. Franc., Arach., VI, 1—3. A moderate sized species is found at Guadaloupe, the male of which has long and slender legs, curved palpi, with the genital organs situated at the extremity of the last joint, and terminated by a slender and arcuated, or falciform hook.

their legs are elevated when at rest; sometimes the two first and two last are the longest, and at others those of the two anterior pairs, or the fourth and the third. The general arrangement of the eyes does not form the segment of a circle or a crescent.

They may be divided into three sections: the first, or that of the Tubitelæ, has cylindrical fusi approximated into a fasciculus directed backwards; the legs are robust, the two first or the two last, and vice versa, longest in some, and the whole eight nearly equal in others.

We will commence with two subgenera, which, with respect to the jaws that describe a circle round the ligula, approach the Filistatæ, and are removed from those that follow.

Clotho, Walck.—*Uroctea*, Dufour.

A singular subgenus. The cheliceræ are very small, can separate but little—thereby approximating this subgenus to the last—and are not indented; very small hooks; the shortness of the body and length of the legs produce a resemblance to the Crab-Spiders or Thomisi. The relative length of these organs differs but little; the fourth pair, and then the preceding one are merely somewhat longer than the first; the tarsi, only, are furnished with spines. The eyes are further from the anterior margin of the thorax than in the following subgenus, and are approximated and arranged as in the genus Mygale of Walckenaer; three on each side form a reversed triangle; the two others form a transverse line in the space comprised between the two triangles. The jaws and the ligula are proportionably smaller than those of the same subgenus; a short projection or slight dilatation on the external side of the jaws, gives insertion to the palpi; the jaws terminate in a point; the ligula is triangular and not nearly oval as in Drassus. The two superior or most lateral fusi are long, but what, according to Dufour, particularly characterizes his Urocteæ or our Clothos, is, that there are two pectiniform valves which open and shut at the will of the animal(1), in place of the two intermediate fusi.

But a single species is known, the *Uroctea 5-maculata*, Dufour, Ann. des Sc. Phys., V, lxxvi, 1; *Clotho Durandii*, Lat.

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(1) I have seen, in a well preserved specimen, six fusi, of which the two superior were much the longest and terminated by an elongated joint, forming an elliptical lamina, and the other four small, the inferior ones particularly, and arranged in a square. The anus, placed under a little membranous projection resembling a clypeus, was furnished on each side with a pencil of retractile hairs. These pencils are the parts named by Dufour pectiniform valves, and are distinct from the two intermediate fusi, which are concealed by the two inferior ones.

The body is five lines in length, of a fine chesnut colour; abdomen black; five small, round, yellowish spots above, four of which are arranged transversely in pairs, and the last or fifth posterior; legs hairy. It is evident from the plates of the great work on Egypt, that M. Savigny found it in that country, and proposed forming a new genus with it. Count Dejean brought it from Dalmatia; and Schreiber, director of the Imperial Museum of Vienna, has sent me specimens captured in the same country. M. Dufour also found it in the mountains of Narbonne, in the Pyrennees and among the rocks of Catalonia. To this latter naturalist we are indebted not only for our knowledge of the external characters of this spider, but for many curious observations relative to its habits. "She constructs," says he, "a shell resembling a calotte or patella an inch in diameter, on the under surface of large stones or in the fissures of rocks. Its contour presents seven or eight emarginations, the angles of which are alone attached to the stone by silken fasciculi, the margin being free. This singular tent is admirably woven. The exterior resembles the very finest taffeta, formed, according to the age of the animal, of a greater or less number of layers. Thus, when the young Uroctea first commences her establishment, she merely forms two webs between which she seeks for shelter. Subsequently, and I believe at each change of tegument, she adds a certain number of layers. Finally, when the nuptial season has arrived, she lines an apartment with a softer and more downy material which is to enclose the sac of eggs and young ones. Although the exterior shell is more or less soiled by foreign bodies which serve to conceal it, the chamber of the industrious architect is always extremely neat and clean. There are four, five, or six egg-pouches or sacculi in each domicil; they are lenticular, more than four lines in diameter, and formed of a snow-white taffeta lined with the softest down. The ova are not produced till the latter end of December or the beginning of January; the young are to be protected from the rigour of winter and the incursions of enemies—all is prepared; the receptacle of this precious deposit is separated from the web that adheres to the stone by soft down, and from the external calotte by the various layers I have mentioned. Some of the emarginations in the edge of the pavilion are completely closed by the continuity of the web, the edges of the remainder are merely laid on each other, so that by raising them up, the animal can issue from its tent or enter it, at pleasure. When the Uroctea leaves her habitation for the chase, she has nothing to fear, she only possesses the secret of the impenetrable emargination, and has the key to those which alone afford an entrance. When her offspring are able to provide for themselves, they leave their native dwelling, to establish elsewhere their individual habitations, while the mother returns to it and dies—it is thus her cradle and her tomb."

Drassus, Walck.

The Drassi differ from Clotho in several characters. Their chelicerae are robust, projecting and dentated beneath; their jaws are obliquely truncated at the extremity, and the ligula forms an inferiorly truncated oval, or an elongated curvilinear triangle; the eyes are nearer to the anterior margin of the thorax, and the line formed by the four posterior ones is longer than the anterior, or extends beyond it on the sides. There is but little difference in the proportions of the fusi, and we do not observe between them the two pectiniform valves peculiar to Clotho. Finally, the fourth pair of legs, and then the first, are manifestly longer than the others. The tibiæ and first joint of the tarsi are armed with spines.

These Spiders live under stones, in the fissures of walls, and on leaves; they construct their cells with an extremely white silk. The cocoons of some are orbicular and flattened, and consist of two valves laid one on the other. M. Walckenaer distributes the Drassi into three families, according to the direction and approximation of the lines formed by the eyes, and the greater or less dilatation of the middle of the jaws.

The species which he calls *viridissimus*, Hist. des Aran. fascic. IV, 9, and which alone composes his third division, weaves a fine, white, transparent web on the surface of a leaf; under this web it seeks for shelter. I have sometimes observed a similar web on the leaf of the Pear-tree, but the margin was angular and resembling a tent, like that of the Clotho, beneath which was the cocoon. It is, I presume, the work of this species of Drassus, and proves the analogy of this subgenus with the preceding one. M. Leon Dufour, Ann. des Sc. Phys., VI, xcv, 1, has given a very complete description of a species of Drassus—*D. segestriformis*—found by him under stones in the highest Pyrennees, and never beneath the Alpine region. It is one of the largest of this subgenus, and appears to me to be closely allied to my *melanogaster*, which I believe to be the *D. lucifugus* of Walckenaer, Schæff. Icon. CI, 7.

One of the prettiest species, which is very commonly observed running along the ground in the vicinity of Paris, is the *D. relucens*. It is small, and almost cylindrical, with a fulvous thorax, invested with a purple silky down; the abdomen is a mixture of blue, red, and green, with metallic reflections, and marked by two transverse and golden lines, of which the anterior is arcuated. Four golden dots are sometimes observed on it(1).

In the other Tubitelæ the jaws do not surround the ligula; their external side is dilated inferiorly beneath the origin of the palpi.

Some have but six eyes, four of which are anterior, and form a transverse line, and the two others posterior, situated, one on each side, behind the two lateral ones of the preceding line. Such is the essential character of the

SEGESTRIA, Lat.

The ligula is elongated and almost square. The first pair of legs, and then the second, is the longest; the third is the shortest. These spiders construct long, silky, cylindrical tubes in the chinks and crevices of old walls, which they inhabit; their first pairs of legs are always directed forwards, and diverging threads border the external entrance of their domicil, forming a net for ensnaring Insects. The genital organ of the *S. perfida—Aranea florentina*, Ross., Faun. Etrusc., XIX, 3—a large black species with green cheliceræ, which is not rare in France, is shaped like a tear, or is ovoido-conical, very acute at the end, entirely salient, and red(2).

The remaining Tubitelæ have eight eyes. On account of the difference in the site of their habitations, we may divide them into the terrestrial and the aquatic. Although the last family of the Araneides of Walckenaer (his Naiades) is composed of these latter, they are so closely allied to the other Tubitelæ, that notwithstanding this disparity of habits they must be placed together. In those which are terrestrial, the ligula is almost square, or but very slightly narrowed, with a very obtuse or truncated summit; the jaws are straight, or nearly so, and more or less dilated towards the extremity; the two eyes of each lateral extremity of the ocular group are generally separated from each other, or at least are geminate and placed on a particular eminence like those of the aquatic Tubitelæ.

CLUBIONA, Lat.

This subgenus is only distinguished from the following one by the nearly equal length of the exterior fusi, and by the straightness of the line formed by the four anterior eyes. The Clubionæ construct silky tubes under stones, in chinks of walls, or between leaves. Their cocoons are globular(1).

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(1) For the other species, see Faun. Paris., Walck., and Tabl. des Aran., Id.

(2) Add the *Seg. senoculata*, Walck., Hist. des Aran., V, vii; *Aranea senoculata*, L.; Deg.

ARANEA.

The true Araneæ, which we at first designated by the generic appellation of Tegenaria, retained by Walckenaer, and to which we add his Angelenæ and Nyssi, have their two superior fusi much longer than the others, and their four anterior eyes arranged in a line posteriorly arcuated or forming a curve..

They construct, in our houses, in the angles of walls, on plants, hedges, along the roads, in the earth, and under stones, a large and nearly horizontal web, at the upper part of which is a tube where they remain motionless(2).

Then follow the Naiades of Walckenaer, or our aquatic Tubitelæ, which form the

ARGYRONETA, Lat.

The jaws are inclined on the ligula, which is triangular. The two eyes of each lateral extremity of the ocular group are closely approximated and placed on a particular eminence; the four others form a quadrilateral.

> *Argyroneta aquatica; Aranea aquatica*, L., Geoff., Deg. Blackish brown, the abdomen darker; silky; four depressed points on the back. It is found on the stagnant waters of Europe, where it swims with the abdomen enclosed in a bubble of air; it forms an oval cell, filled with air, and lined with silk, from which various threads extend to the surrounding plants. Here it lies in wait for its prey, deposits its cocoon, which it carefully watches, and encloses itself to pass the winter.

In the second section of the sedentary and rectigrade spiders, that of the INEQUITELÆ, the external papillæ are nearly conical, project but little, are convergent, and form a rosette; the legs are very slender. The jaws incline over the lip, and become narrower at their superior extremity, or at least do not sensibly widen.

Most of them have the first pair of legs longest, and then the fourth. The abdomen is more voluminous, softer, and more coloured than in the preceding tribes. Their webs form an irregular net composed of threads which cross each other in every direction and on several planes. They lie in wait for their prey, display much anxiety for the preservation of their eggs, and never abandon them till they are hatched. They are short-lived.

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(1) *Aranea holosericea*, L.; Degeer, Fab.; Walck., Hist. des Aran. IV, iii, fem.;—*Aranea atrosc*, Deg., Fab.; List., Aran., XXI, 21; Albin, Aran., X, 48, and XVII, 82. See also Tab. des Aran., and the Faun. Paris., Walckenaer.

(2) *Aranea domestica*, L., Deg., Fab.; Clerck., Aran. Suec., pl. ii, tab. ix;—*Tegeneria civilis*, Walck., Hist. des Aran., V, v;—*Aranea labyrinthica*, L., Fab.; Clerck, Aran., Suec. pl. ii, tab. viii. See the Tab. des Aran., Walck.

In some, the first pair of legs, and then the fourth, are the longest.

Scytodes, Lat.

But six eyes arranged in pairs. According to Dufour, the hooks of their tarsi are inserted into a supplementary joint.

Two species are known, one of which, the *thoracica*(1) inhabits houses in Europe, and the other, *la blonde*, Ann. des Sc. Phys. V, lxxvi, 5, was found under calcareous debris in the mountains of Valencia. It weaves a uniform tube of a thin milk-white tissue, like that of the Dysdera erythrina.

Theridion, Walck.

Eight eyes disposed as follows: four in the middle forming a square, the two anterior of which are placed on a little eminence, and two on each side, also situated on a common elevation. The thorax has the figure of a reversed heart, or is nearly triangular. This subgenus is very numerous(2).

Therid. malmignatte; *Aranea* 13-*guttata*, Fab.; Ross. Faun. Etrusc., II, ix, 10. The lateral eyes separated from each other; body black, with thirteen small, round, blood-red spots on the abdomen. Its bite is considered venomous and even mortal. From Tuscany and Corsica(3).

The *A. mactans*, Fab., a second species of Theridion inhabiting South America, is equally dreaded in that country. This prejudice against these animals appears to originate from their black colour, varied with sanguine spots.

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(1) *Scytodes thoracica*, Lat., Gen. Crust. et Insect. I, v, 4; Walck. Hist. des Aran., I, x, and II, Suppl.

(2) See the Tab. and Hist. des Aran., Walcken., the Ann. des Sc. Nat., and Ann. des Sc. Phys. The Araneæ *bipunctata*, *redimita*, L., and the *A. albo-maculata*, Deg., &c., should be referred to this genus.

(3) This species is the type of the genus *Latrodecta*, Walck., which he distinguishes from that of Theridion by the difference in the respective length of the feet; in this, however, he appears to me to have erred.

His *Theridion benignum*, Hist. des Aran. fasc. V, viii, whose habits he has carefully studied, establishes its domicil between the clusters of grapes, and defends them from the attacks of various Insects.

EPISINUS, Walck.

Eight eyes also, but they are approximated on a common elevation; the thorax is narrow and almost cylindrical(1).

In the remaining Inequitelæ, the first pair of legs, and then the second, are the longest. Such is the

PHOLCUS, Walck.

Where the eight eyes are placed on a tubercle, and divided into three groups; one on each side consisting of three eyes, forming a triangle, and the third in the middle, somewhat anteriorly, and composed of two on a transverse line.

> *Ph. phalangioides*, Walck., Hist. des Aran., fasc. V, tab. x; *Araignée domestique à longues pattes*, Geoff. The body long, narrow, pale yellowish or livid, and pubescent; abdomen nearly cylindrical, very soft, and marked above with blackish spots; very long, slender legs; a whitish ring round the extremity of the thighs and tibiæ. Common in houses, where it spins a web of a loose texture, in the angles of the walls. The female cements her eggs into a round naked mass, which she carries between her mandibles.
>
> M. Dufour has found a second species, the *Pholque à queue*—Ann. des Sc. Phys. V, lxxvi, 2,—in the clefts of the rocks in Moxente, Valencia. Its abdomen terminates in a conical point, and thus forms a sort of tail, like that of the Epeira conica. Like the preceding species, it balances its body and feet. The genital organs of the male are very complex.

In the third section of the sedentary rectigrade spiders, the ORBITELÆ, or *Araignées Tendeuses* of others, the external fusi are almost conical, slightly salient, convergent, and form a rosette; the legs are slender, as in the preceding section, but the jaws are straight and evidently wider at their extremity.

The first pair of legs, and then the second, are always the longest. There are eight eyes thus arranged: four in the middle forming a quadrilateral, and two on each side.

The Orbitelæ approach the Inequitelæ in the size, softness, and diversity of colour of the abdomen, and in their short term of existence; but their web is a regular piece of net-work, composed of concentric circles intercepted by straight radii diverging from the centre, where they almost always remain, and in an inverted position, at the circumference. Some conceal themselves in a cell or cavity which they have constructed near the margin of the web, which is sometimes horizontal, and at others perpendicular. Their eggs are agglutinated, very numerous, and inclosed in a voluminous cocoon.

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(1) *Episinus truncatus*, Lat. Gener. Crust. et Insect. t. IV, p. 371. Italy, and environs of Paris.

The threads which support the web, and which can be extended one-fifth of their length, are used for the divisions of the micrometer. This observation was communicated to us by M. Arrago.

Linyphia, Lat.

The Linyphiæ are well characterized by the disposition of their eyes: four in the middle form a trapezium, the posterior side of which is widest, and is occupied by two eyes much larger and more distant; the remaining four are grouped in pairs, one on each side, and in an oblique line. The jaws are only widened at their superior extremity.

They construct on bushes a loose, thin, horizontal web, attaching to its upper surface, at different points, or irregularly, separate threads. The animal remains at its inferior portion, and in a reversed position(1).

Uloborus, Lat.

The four posterior eyes placed at equal intervals on a straight line, and the two lateral ones of the first line nearer to the anterior edge of the thorax than the two comprised between them, so that this line is arcuated posteriorly. Their jaws, like those of the Epeiræ, begin to widen a little above their base, and terminate in the form of a palette or spatula. The tarsi of the three last pairs of legs terminate by one small nail. The first joint of the two posterior ones has a range of small setæ.

The body of these animals, as well as in the following subgenus, is elongated and nearly cylindrical. Placed in the centre of their web, they advance their four anterior legs in a straight line, and extend the two last in an opposite direction; those of the third pair project laterally.

These Arachnides construct webs similar to those of other Orbitelæ, but they are looser and more horizontal. They will completely envelope the body of a small coleopterous insect in less than three minutes. Their cocoon is narrow, elongated, angular at the margin, and suspended vertically to a web by one of its extremities. The other end is bifurcated or terminated by two prolonged angles one of which is shorter than the other and obtuse; there are two acute angles on each side. For these interesting observations I am indebted to my friend M. Leon Dufour.

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(1) *Linyphia triangularis*, Walck., Hist. des Aran., V, ix, female; *Aranea resupina sylvestris*, De Geer; *Aranea montana*, L.; Clerck., Aran. Suec., pl. III, Tab. I;—*Aranea resupina domestica*, De Geer.

Uloborus Walckenaerius, Lat.(1) About five lines in length; reddish-yellowish; covered with a silky down forming two series of little fasciculi on the top of the abdomen; paler rings on the legs. From the woods in the vicinity of Bourdeaux, and in various departments of the south of France.

TETRAGNATHA, Lat.

The eyes placed four by four on two nearly parallel lines, and separated by almost equal intervals; jaws long, narrow, and only widened at their superior extremity. The chelicerae are also very long, in the males especially. The web is vertical(2).

EPEIRA, Walck.

The two eyes on each side approximated by pairs, and almost contiguous; the remaining four forming a quadrilateral in the middle. The jaws dilate from their base, and form a rounded palette.

The cucurbitina is the only species known whose web is horizontal; that of the others is vertical, or sometimes oblique.

Some place themselves in its centre in a reversed position, or with their head downwards; others construct a domicil close by it, either vaulted on all sides, or forming a silky tube composed of leaves drawn together by threads, or open above, and resembling a cup or the nest of a bird. The web of some exotic species is formed of such stout materials that it will arrest small Birds, and even impede the progress of a Man.

Their cocoon is usually globular; that of some species, however, is a truncated oval, or very short cone.

The natives of New Holland—Voyage à la recherche de la Peyrouse, p. 239—and those of some of the South Sea Islands, for want of other food, eat a species of Epeira, closely allied to the *Aranea esuriens*, Fab.

M. Walckenaer, in his Tableau des Aranéïdes, mentions sixty-four species of Epeiræ, remarkable, in general, for the diversity of their colours, form and habits. He has arranged them in various small and very natural families, the study of which we have endeavoured to simplify in the second edition of the Nouv. Dict. d'Hist. Nat., article *Epeïre*. Certain important considerations, such as those of the sexual organs, had been neglected or were not sufficiently attended to; thus, for instance, the female Ep. diadema, and others, present at the part which characterizes their sex, a singular appendage, which reminds us of the apron of the Hottentot women. These species should constitute a separate division. By pursuing this examination, other not less natural divisions might be established.

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(1) Lat., Gen. Crust. et Insect., I, 109; see also second edition of the Nouv. Dict. d'Hist. Nat., article *Ulobore*.

(2) *Tetragnatha extensa*, Walck., Hist. des Aran., V, vi; *Aranea extensa*, L., Fab., De Geer;—*Aranea virescens?* Fab.;—*Aranea maxillosa*, Id. See Tab. des Aran. of Walckenaer.

We will content ourselves with mentioning a few of the principal species, commencing with those that are indigenous to Europe.

Ep. diadema; Aranea diadema, L., Fab.; Rœs., Insect. IV, xxxv—xl. Large, reddish, velvety; abdomen of the females extremely voluminous, particularly when about to lay their eggs, and of a deep brown or yellowish red; a large rounded tubercle each side of the back near its base, and a triple cross, formed of small white spots or dots; palpi and legs spotted with black. Very common in Europe in autumn. The eggs are hatched in the spring of the ensuing year.

Ep. scalaris; Aranea scalaris, Fab.; Panz., Faun. IV, xxiv. Thorax reddish; top of the abdomen usually white, with a black spot in the form of a reversed triangle, oblong and dentated. weaves its web along the banks of ponds, brooks, &c.

Ep. cicatricosa; Aranea cicatricosa, De Geer; *A. impressa,* Fab. The abdomen flattened, and of a greyish brown or obscure yellowish; a black band, festooned and edged with grey along the middle of the back; eight or ten large impressed points in two lines. It constructs its web on walls or other bodies, and remains concealed in a nest of white silk, which it forms under some projecting object, or in some cavity in the vicinity. It only works and feeds during the night, or when the light of day is but weak. It retires under the bark of old trees or logs.

Ep. sericea, Walck., op. cit., III, ii. Covered above with a silvery and silken down; abdomen flattened, immaculate and with festooned margins. South of Europe and Senegal.

Ep. fusca, Walck., Hist. des Aran. II, i, the female. Very common in the cellars of Angers. Its cocoon is white, almost globular, fixed by a pedicle, and composed of very fine threads; it is soft to the touch, like wool. That of the

Ep. fasciata, Walck., op. cit. III, i, the female, is about an inch long; it resembles a little balloon, of a grey colour, with longitudinal black stripes, one of whose extremities is truncated and closed by a flat and silky operculum; a fine down envelopes the eggs in its interior. This species weaves a vertical and irregular web, in the middle of which it remains, along the banks of rivulets, &c. Its thorax is covered with a soft and silvery down, and its abdomen is of a beautiful yellow, intersected at intervals with transverse brown, or blackish-brown lines, arcuated and slightly undulated. M. Leon Dufour, Ann. des Sc. Phys. VI, pl. xcv, 5, has given a detailed description of this species, and of its habits, and was the first who ascertained the male. He has figured its sexual organ. The penis resembles a twisted seta.

Ep. cucurbitina; Aranea cucurbitina, L.; *A. senoculata*, Fab.; Walck. Hist. des Aran., III, iii. Small; abdomen ovoid and lemon-coloured, marked with black points; a red spot on the anus. It weaves a small horizontal web between the stems and leaves of plants.

Ep. conica; Aranea conica, De Geer and Pall.; Walck. Hist. Nat. des Aran., III, iii. Remarkable for its abdomen, which is gibbous anteriorly and has a conical termination; the anus is placed in the centre of an eminence. When it has extracted the juices from an insect, it suspends it to a thread.

Immediately after the conica, we may place the species called by Dufour *Epeïre de l'opuntia*—Ann. des Sc. Phys., V, lxix, 3—from the circumstance of its always weaving its loose and irregular web among the leaves of the Agave and Opuntia. It is black, with white hairs laid close to the body, having an appearance of scales. The abdomen has two pyramidal tubercles on each side, and terminates posteriorly in two others, which are obtuse and separated by a wide emargination. The posterior face of each tubercle is marked with a beautiful snow-white spot, resembling nacre; these spots are connected with each other, and with one or two more behind them, by white zig-zag lines. In the newly-hatched animal, these tubercles are not visible. The cocoons are oval, whitish, and formed of two coats, the interior of which is a kind of tow that envelopes the ova. Seven, eight, and even ten of these cocoons are frequently found arranged in file, or one after another. From Catalonia and Valencia.

Some of the species foreign to Europe are very remarkable. Here we observe the abdomen is invested with an extremely firm skin, furnished with points or horny spines(1); and there the legs are provided with bundles of hairs(2).

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(1) The *Ar. militaris, spinosa, cancriformis, hexacantha, tetracantha, geminata, fornicata*, of Fabricius. M. Vauthier, one of our best painters of subjects of natural history, has described and figured, Ann. des Sc. Nat., I, p. 161, a species of this division—*curvicauda*—which is very remarkable for its posteriorly widened abdomen, terminated by two long arcuated spines: it inhabits Java. These spinous species might form a peculiar subgenus.

(2) The *Ar. pilipes, clavipes*, &c., of Fabricius. His *Ar. maculata* forms the genus *Nephila*, Leach. See the Tab. and Hist. des Aran. of Walckenaer.

We now come to Spiders that are sedentary, like the preceding, but which have the faculty of moving sideways, forwards and backwards, in a word, in all directions. They constitute our section of the LATERIGRADÆ. The four anterior legs are always longer than the others; sometimes the second pair surpasses the first, and at others, they are nearly equal; the animal extends them to the whole of their length on the plane of position.

The cheliceræ are usually small, and their hook is folded transversely, as in the four preceding tribes. Their eyes, always eight in number, are frequently very unequal, and form a segment of a circle or crescent; the two posterior lateral ones are placed farther back than the others, or are nearer to the lateral margin of the thorax. The jaws, in most of them, are inclined on the lip. The body is usually flattened, resembling a crab; the abdomen is large, rounded, and triangular.

These Arachnides remain motionless on plants, with their feet extended. They make no web, simply throwing out a few solitary threads to arrest their prey. Their cocoon is orbicular and flattened. They conceal it between leaves, and watch it until the young ones are hatched.

MICROMMATA, Lat.—*Sparassus*, Walck.

Jaws straight, parallel and rounded at the end; eyes arranged four by four, on two transverse lines, the posterior of which is longest, and arcuated backwards. The second legs, and then the first, are the longest; the ligula is semicircular(1).

Microm. smaragdula; Ar. smaragdula, Fab.; *Ar. viridissima*, De Geer; Clerck, Aran. Suec. pl. 6, tab. iv. A medium size; green; the sides edged with light yellow; abdomen greenish yellow, intersected on the middle of the back by a green line.

It ties three or four leaves in a triangular bundle, lines the interior with a thick layer of silk, and places its cocoon in the middle; the latter is round, white, and so diaphanous, that the ova can be perceived through its parietes. The eggs are not agglutinated.

M. Argelas; Dufour, Ann. des Sc. Phys., VI, p. 306, XCV, 1; Walk., Hist. des Aran., IV, ii. This animal, whose specific appellation will remind the French naturalists of one of their most zealous savans, one already recommended by me to their esteem as my protector from the horrors of the revolution, is one of the largest species indigenous to France; M. Dufour has completed my description of it, and has observed its habits. The body is about seven or eight lines in length, of a cinereous flaxen colour, covered with down, and more or less spotted with black. The top of the abdomen, from its middle to the extremity, is marked with a band formed of a series of small hatchet-shaped spots, of the last mentioned colour. A black longitudinal band, grey in the middle, runs along its under surface. The legs are annulated with black. This species was discovered by the naturalist to whom I have dedicated it, in the environs of Bourdeaux. M. Dufour has since found it in the most barren mountains of Valencia. It runs with great velocity, the feet being extended laterally. Its unguiculated palettes enable it to cling to the smoothest surface, and in every possible position. It constructs a cocoon, which in texture resembles that of the Clotho of Durand, on the under surface of stones, to which it retires for shelter in bad weather, to escape from enemies, and to lay its eggs. It is an oval tent, nearly two inches in diameter, attached to the stone in the manner of a marine Patella. It is formed of an external envelope, consisting of a yellowish taffeta, as fine as the peel of an onion, but rigid, and of an inner lining which is more supple, softer, and open at both ends. It is from these openings, which are furnished with valves, that the animal issues. The cocoon is globular, and placed underneath its dwelling, so that it can brood over it; it contains about sixty eggs.

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(1) M. Walckenaer places this genus in that series which is composed both of the Vagabundæ and the Sedentariæ, such as the *Attæ* or our Saltici, the *Thomisi, Philodromi, Drassi*, and *Clubionæ*, and which have but two hooks to the tarsi.

The same naturalist has described and figured, another species, the *M. à tarses spongieux*—Ann. des Sc. Phys., V, lxix, 6—which he found on a tree in a garden at Barcelona. From its habits, however, and some of its characters, I presume that it belongs to the genus Philodroma of Walckenaer(1).

SENELOPS, Duf.

The Senelopes form the transition from the preceding genus to the following one. The jaws are straight or but slightly inclined, without any lateral sinus, and taper to a point obliquely truncated on the inner side. The ligula is semicircular like that of the Micrommatæ, but the eyes are arranged differently. There are six before forming a transverse line; the two others are posterior, and situated one on each side, behind each extremity of the preceding line. The legs are long; the second pair, and then the third and fourth, are longer than the first.

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(1) For the other species, see the Tab. des Aran., Walck., and his Hist. des Aran., fascic. IV, *Sparassus roseus*, X, the male;—Ib., fascic. II, viii, the male. I think we should refer to this subgenus the *Aranea venatoria*, L.,—Sloane's Hist. of Jam., CCXXV, 1, 2; Nhamdiu, 2? Pison;—and another species from India very analogous to the preceding, figured on Chinese drawings and paper-hangings.

The type of the genus, *Senelops omalosoma*, Dufour, Ann. des Sc. Phys. V, lxix, 4, was found by M. Dufour in Valencia, but it is very rare there. The body is about four lines in length and very flat, of a greyish red, with cinereous spots; the feet are annulated with black. The posterior part of the abdomen seems to exhibit vestiges of annuli, forming on the sides an appearance of teeth. It lives among rocks, and when escaping from pursuit flies with the rapidity of an arrow. It is also found in Syria—Collection of M. Labillardière—and in Egypt. Other species inhabit Senegal, the Cape of Good Hope and the Isle of France.

PHILODROMUS, Walck.(1)

The Philodromi differ from the two preceding subgenera in their jaws, which are inclined on the ligula, which is also higher than it is wide. The almost equal eyes always form a crescent or semicircle. The lateral ones are never placed on tubercles or eminences. The chelicerae are elongated and cylindrical; the four or two last legs do not materially differ in length from the others.

According to Walckenaer these animals run with great swiftness, their legs extended laterally, lie in wait for their prey, throw out solitary threads to entrap it, and conceal themselves in crevices or among leaves.

In some the body is broad and flat, the abdomen short and widened posteriorly, and the four intermediate legs the longest. Such is the *Philodrome tigrée; Thomise tigré*, Lat.; *Araneus marguritarius*, Clerck, VI, iii; Schæff., Icon., lxxi, 8; Frisch, Ins., Centur., II, xiv; *Aranea levipes*, L. ? It is about three lines in length. Its two anterior intermediate eyes and the four lateral ones are situated on a slight elevation, and the latter, according to the same naturalist, are somewhat the largest, or at least are more apparent. The thorax is very wide, flattened, of a reddish fawn colour, brown laterally and posteriorly, and white anteriorly. The abdomen, which forms a kind of pentagon, is speckled by the red, brown and white hairs which cover it, and edged laterally with brown; there are four or six impressed points on the middle of the back. The belly is whitish, and the legs are long, slender and reddish, with brown spots.

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(1) In the first edition of this work, this subgenus formed our first division of the Thomisi.

This species is very common on trees, wooden partitions, walls, &c., where it remains as if glued, with the feet extended. If touched, it runs with astonishing rapidity, or falls to the ground supported by a thread. The cocoon is of a beautiful white, and contains about a hundred eggs, which are yellow and free. The female places it in hollows of trees or clefts of posts, &c., exposed to the north, and carefully watches it.

The other Philodromi, which, according to the method of M. Walckenaer, form several small groups, have the body, and sometimes the chelicerae, proportionably longer. The abdomen is sometimes pyriform or ovoid, and sometimes cylindrical. The second pair of legs and then the first or the fourth are the longest..

Philodromus rombiferus, Walck., Faun. Franc., Aran., VI, 8, the male. Its body is three lines and a half in length and reddish; the second legs and then the two last are the longest; sides of the thorax brown; the abdomen ovoid, with a black or brown lozenge-shaped spot above, bordered with white.

Philodromus oblongus, Walck., Ib., tab. ead., fig. 9. This species, as respects the relative proportion of the legs, and the disposition of the eyes, belongs to the same division; but the abdomen is longer and almost cylindrical or forming an elongated cone, with three brown longitudinal streaks and points on a yellowish ground, which is also the colour of the thorax. In the middle of the latter are two brown streaks forming an elongated V.

These two species inhabit the environs of Paris. For the other, see the Faune Française, from which we have extracted the preceding descriptions.

THOMISUS, Walck.

The Thomisi differ from the Philodromi in their chelicerae, which are smaller in proportion and cuneiform, and in their four posterior legs, which are evidently and even suddenly shorter than the preceding ones. The lateral eyes are frequently situated on eminences, while those of the Philodromi are always sessile. Here also the two posterior lateral ones are further behind than the two that are intermediate on the same line, while in the Thomisi these four eyes are nearly on a level.

The species of this genus are those more particularly designated by the name of Crab-Spiders. The males frequently differ greatly from the females in colour and are much smaller.

Some of them, all exotic(1), have their eyes arranged four by four on two transverse and almost parallel lines, the posterior of which is the longest.

In the others, and the greater number, the ensemble of these eyes represents a crescent, the convex side of which is forwards and outwards.

Thomisus globosus; Aranea globosa, Fab.; *Aranea irregularis,* Panz., Faun. Insect. Germ. fascic. LXXIV, tab. xx, female; Walck., Faun. Franc., Aran., VI, 4. Three lines long; black; abdomen globular; red or yellowish all round the back.

Thomisus cristatus; Clerck, Aran. Suec., pl. 6, tab. vi, size of the preceding; body grey-reddish, sometimes brown, with scattered hairs; feet with small spines; lateral eyes largest and placed on a tubercle; a transverse yellowish stripe on the front of the thorax; two others of the same colour on the back forming a V; abdomen rounded, and a yellowish band on the middle of the back with three indentations on each side. A common species frequently observed on the ground.

Thomisus citreus; Aranea citrea, De Geer; Schæff. Icon. Insect., tab. xix, 13. A lemon yellow, with a large abdomen wider behind; two red or saffron coloured streaks or spots are frequently observed on the back. On flowers(2).

A subgenus established by M. Walckenaer, under the name of Storena, but which is yet but imperfectly known, should apparently terminate this section and lead to Oxyopes, which are as nearly allied to the Crab-Spiders as to the Citigradæ. The Storenæ have their jaws inclined on the ligula, which is nearly of the same length, and forms an elongated triangle; the chelicerae are conical; the two anterior legs, and then the second, longest; the two following ones longer than the last. The eyes are arranged in three transverse lines, 2, 4, 2; the posterior, with the two intermediate ones of the second lines, form a small square, and the two anterior ones are distant(3).

Other Araneæ whose eyes, always eight in number, extend more along the length of the thorax, than across its breadth, or at least almost as much in one direction as the other, and which form either a truncated curvilinear triangle or oval, or a quadrilateral, constitute a second general division, or the Vagabundæ, which I have thus named to distinguish them from those of the first, or the Sedentariæ.

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(1) *Thomisus Lamarck,* Lat., a species allied to the *Aranea nobilis,* Fab.;—*T. canceridus,* Walck., ejusd.;—*T. leucosia; Aranea regia?* Fab.;—*T. plagusius;*—*T. pinnotheres.*

(2) See the Tab. des Aran., Walck.; the Faune Franc., Id., and the Ann. des Sc. Phys., for the Spanish species described by M. Dufour, see also Nouv. Dict. d'Hist. Nat. second edition, article *Thomise.*

(3) See Tab. des Aran., Walckenaer, IX, 85, 86.

Two or four of their eyes are frequently much larger than the others; the thorax is large, and the legs robust; those of the fourth pair and then the two first, or those of the second pair, are usually the longest.

They make no web, but watch for their prey and seize it, either by hunting it down, or by suddenly leaping upon it.

We divide them into two sections.

The first, that of the Citigradæ, is composed of the Araignées-Loups of authors. The eyes form either a curvilinear triangle, an oval, or a quadrilateral, of which, however, the anterior side is much narrower than the widest part of the thorax. This part of the body is ovoid, narrowed before, and carinated along the middle of its length. The legs are usually only fit for running. The jaws are always straight, and rounded at the end.

Most of the females remain on their cocoon, or carry it with them at the base of the abdomen, or suspended to the anus. Nothing but the most extreme necessity will induce them to abandon it, and when the danger is over, they always return in search of it. They also take care of their young for a certain period after they are hatched.

Oxyopes, Lat.—*Sphasus*, Walck.

The eyes arranged two by two, on four transverse lines, the two extreme ones the shortest; they describe a sort of oval, truncated at each end. The ligula is elongated, narrowest at base, dilated and rounded towards the end. The first pair of legs is the longest; the fourth and second are nearly equal; the third is the shortest(1).

Ctenus, Walck.

The eyes arranged in three transverse lines, which become gradually longer—2, 4, 2—and form a sort of curvilinear, reversed triangle, with a truncated apex. The ligula is square, and almost isometrical; the fourth pair of legs, and then the first, are the longest; the third is the shortest.

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(1) *Sphasus heterophthalmus*, Walck., Hist. des Aran. fasc. III, tab. viii, female; *Oxyopes variegatus*, Lat.; *Sphasus italicus*, Walck., Ib., Fasc. IV, tab. viii, female; *Oxyopes lineatus*, Lat., Gener. Crust. et Insect., I, v, 5, female. See article Oxyope, in the entomological part of the Encyclop. Méthod., the Tab. des Aran., Walck., and the Faune Française.

This genus was established on a large species found at Cayenne. Others have since been discovered in the same island and in Brazil, but none of them have been described.

DOLOMEDES, Lat.

The eyes, arranged in three transverse lines, 4, 2, 2, form a quadrilateral, somewhat wider than long; the two posterior ones are placed on an elevation. The second pair of legs is as long as or longer than the first; those of the fourth are still longer. The ligula is square and as broad as it is high, like that of a Ctenus.

In some, the two lateral eyes of the anterior line are larger than the two intermediate ones; their abdomen is an oblong oval terminating in a point.

The females construct an infundibuliform, silky nest on the tops of trees covered with leaves, or on bushes; there they lay their eggs, and when they go abroad to hunt or are forced to abandon their retreat, they always bear off their cocoon which is attached to the base of the abdomen. Clerck says he has seen them spring upon flies which were buzzing around them(1).

They inhabit the borders of streams, run over their surface with the most surprizing rapidity, and can even partly enter the water without becoming wet. The females weave a coarse irregular web, between the branches of plants, in which they place their cocoon. They watch it till the ova are hatched(2).

LYCOSA, Lat.

The eyes of the Lycosæ also form a quadrilateral, but one as long or longer than it is wide; the two posterior eyes are not placed on an elevation. The first pair of legs is evidently longer than the second, but shorter than the fourth, which, in this respect, surpasses all the others. The internal extremity of the jaws is obliquely truncated. The ligula is square but longer than it is broad.

Almost all the Lycosæ keep on the ground, where they run with great swiftness. They inhabit holes accidentally presented to them, or which they excavate, lining their parietes with silk, and enlarging them in proportion to their growth. Some establish their domicil in chinks and cavities in walls, where they form a silken tube covered externally with particles of earth or sand. In these retreats they change their tegument, and, as it appears, after closing the opening, pass the winter. There also the females lay their eggs. When they go abroad they carry their cocoon with them, attached to the anus by threads. On issuing from the egg the young ones cling to the body of the mother and remain there until they are able to provide for themselves.

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(1) *Araneus mirabilis*, Clerck, Aran. Suec., pl. v, tab. 10; *Aran. rufo-fasciata*, De Geer; *Ar. obscura*, Fab. See the Faune Française—*Dolomèdes sylvains*—and the Ann. des Sc. Phys.—*Dolomède spinimane*, Dufour, V, lxxvi, 3.

(2) *Dolomedes marginatus*, Walck.; *Araneus undatus*, Clerck, V, tab. 1; De Geer, Insect. VII, xvi, fig. 13, 15; Panz., Faun., LXXI, 22;—*Dolomedes fimbriatus*, Walck.; De Geer, Insect. VII, xvi, 9—11;—*Araneus fimbriatus*, Clerck, V, tab. ix. These species compose the division of the shore Dolomèdes of Walckenaer.

The Lycosæ are extremely voracious, and courageously defend their dwelling.

A species of this genus, the *Tarentula*, so called from Tarentum, a city of Italy, in the environs of which it is common, is highly celebrated. The poisonous nature of its bite is thought to produce the most serious consequences, being frequently followed by death or *Tarentism*, results which can only be avoided by the aid of music and dancing. Well informed persons, however, think it more necessary in these cases to combat the terrors of the imagination than to apply an antidote to the poison; medicine at all events presents other means of cure.

Several curious observations on the *Lycosa tarentula* of the south of France have been published by M. Chabrier, Acad. de Lille, fascic. IV.

This genus is very rich in species, which have not as yet, however, been well characterized.

Lyc. tarentula; Aranea tarentula, L., Fab.; Albin, Aran., tab. xxxix; Senguerd. de Tarent. An inch long; under part of the abdomen red; crossed in the middle by a black band.

The Tarentula of the south of France—*Lycose narbonnaise*, Walck., Faun. Franç., Aran., I, 1—4, is not quite so large; the under part of its abdomen is very black and edged all round with red.

A similar species is found in the environs of Paris, the *Lycose ouvrière*, or *L. fabrilis*, Clerck, Aran. Suec., pl. 4, tab. ii; Walck., Faun. Franç., Aran., II, 5.

Lyc. saccata; Aranea saccata, L.; *Araneus amentatus*, Clerck, IV, tab. viii; Lister, tit. 25, f. 25. Small; blackish; carina of the thorax, obscure reddish, with a cinereous line; a little bundle of grey hairs at the superior base of the abdomen; legs of a livid red, varied with blackish spots; the cocoon flat and greenish—very common about Paris(1).

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(1) For the other species see the Tabl. and Hist. des Aran. of Walckenaer, and the Faune Française, Aran., Id. See also the second edition of the Nouv. Dict. d'Hist. Nat., article *Lycose*.

We will terminate this section with the subgenus

MYRMECIA, Lat.,

Which seems to lead to the following one, and whose characters we have detailed in the Ann. des Sc. Nat., III, p. 27. The eyes form a short and broad trapezium; there are four before in a transverse line; two others, more internal than the two last of the preceding ones, form a second transverse line; the last two are behind the two preceding ones. The cheliceræ are stout. The jaws are rounded and very hairy at the end. The ligula is nearly square; somewhat longer than broad. The legs are long, and almost filiform; those of the fourth and first pairs are the longest of all. The thorax seems to be divided into three parts, of which the anterior is much the largest and square, the two others resemble knots or humps. The abdomen is much shorter than the thorax, and is covered with a solid epidermis, from its origin to the middle.

The *Myr. fulva*, on which I have established this genus, inhabits Brazil; other species however appear to be found in Georgia, United States of America.

In the second section of the Vagabundæ, that of the SALTIGRADÆ, called by others *Araignées phalanges*, the eyes form a large quadrilateral, the anterior side of which, or the line formed by the first ones, extends across the whole width of the thorax; this part of the body is almost square or semi-ovoid, plane or but slightly convex above, as wide anteriorly as in the rest of its extent, and descending suddenly on the sides. The legs are fitted for running and leaping. The thighs of the two fore legs are remarkable for their size.

The *Araignée à chevrons blancs* of Geoffroy, a species of Salticus very common in summer on walls or windows exposed to the sun, moves by jerks, stops short after a few steps and raises itself on its fore legs. If it discover a fly, or particularly a musquito, it approaches softly, and then darts upon the victim with a single bound. It leaps fearlessly and perpendicularly on a wall, being always attached to it by a thread, which lengthens as it advances. This same filament also supports it in the air, enables it to ascend to its point of departure, and allows it to be wafted by the wind from one place to another. Such, generally, are the habits of the species that belong to this division.

Several construct nests of silk resembling oval sacs open at both ends, between leaves, under stones, &c. Thither they retire to change their tegument and to seek shelter in bad weather. If danger menaces them there, they leave it at once and escape with speed.

The females construct a sort of tent, which becomes the cradle of their posterity, and in which the young ones, for a time, live in common with the mother.

Certain species, resembling Ants, elevate their anterior legs and make them vibrate with great rapidity.

Singular combats sometimes ensue between the males, but no fatal issue occurs.

A subgenus established by M. Rafinesque, that of

TESSAROPS,

Appears to us to approximate closely to the following one in most of its characters and habits, but to be widely removed from it, if there be no mistake, in the number of the eyes which is but four. See Ann. Gener. des Sc. Phys., VIII, p. 88.

A second subgenus, which also is only known to us by description, is the

PALPIMANUS, Duf.,

Described by M. Dufour in the Ann. des Sc. Phys., V, lxix, 5, and which appears to him to be intermediate between Eresus and Salticus. The disposition of the eyes is about the same as in the first of these two subgenera. The ligula is similarly triangular and pointed, and the jaws are still dilated and rounded at the end; but according to M. Dufour, they are inclined and not straight like those of the Eresi. The terminal joint of the anterior tarsi is inserted laterally and has no hooks.

He describes one species, the *Palpimane bossu.* It never jumps, walks slowly, and is found under stones in Valencia, where, however, it is extremely rare.

A new species has been discovered by M. Lefèvre in Sicily, which appears to me to belong to this genus.

In the two following subgenera there are always eight eyes; the jaws are straight.

ERESUS, Walck.

Four eyes forming a small trapezium near the middle of the anterior extremity of the thorax, the other four on its sides forming a similar but much larger figure. The ligula is triangular and pointed. The tarsi are terminated by three hooks(1).

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(1) *Eresus cinnaberinus,* Walck.; *Aranea quatuor-guttata,* Ross., Faun. Etrusc., II, 1, 8, 9; Coqueb., Illust. Icon. Insect., dec. III, xxvii, 12;—*Aranea nigra,* Petag., Specim. Insect. Calab. M. Dufour, Ann. des Sc. Phys., has described two Spanish species; one of them the *Eresus acanthophilus*—VI, xcv, 3, 4—is my *Erese rayé* of

SALTICUS, Lat.—*Attus*, Walck.

Four eyes, the two intermediate of which are the largest, on the anterior part of the thorax in a transverse line, and the others near its lateral edges, two on each side; they also form a large square open behind, or a parabola. The ligula is very obtuse or truncated on the summit. There are but two hooks to the extremity of the tarsi. Several of the males have very large cheliceræ.

The thorax of some is very thick and sloping, (en talus) and much inclined at base.

Salt. Sloanei; Aranea sanguinolenta, L. Black; a white line formed by down on each side of the thorax; the abdomen of a cinnabar-red, with an elongated black spot on the middle of the back. South of France, on stones(1).

The thorax of the others is much flattened, insensibly sloping at its base.

Sometimes their body is simply oval, and furnished with hairs or thick down; the legs short and robust.

Saltique chevronné; Aranea scenica, L.; *Araignée à chevrons*, Geoff.; *Araignée à bandes blanches*, De Geer, Insect., VII, xvii, 8, 9. About two lines and a half long; above, black; margin of the thorax, and three lines en chevron on the top of the abdomen, white. Very common(2).

Sometimes the body is narrow, elongated, almost cylindrical and shorn; the legs long and slender.

Salt. formicarius; Aranea formicaria, De Geer, Insect., VII, xviii, 1, 2; *Atte fourmi*, Walck., Faun. Franç., Aran., V, 1—3. Reddish; fore part of the thorax black; black band and two white spots on the abdomen(3).

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the Nouv. Dict. d'Hist. Nat.; the other, *Eresus imperialis*—V, lxix, 2—is closely allied to the *Aranea nigra*, Petagna, above quoted. These two species are figured in the Faune Française, Aran., pl. IV, 3, 4, 5. See also on same plate, fig. 7, the *Erèse cinabre*.

(1) This division comprizes the following Atti of Walckenaer: *bicolor*, *chalybeus*, *niger*, *cupreus*, *muscorum*, the *Aranea gossipes*, De Geer.

(2) Add, *Attus tardigradus*, Walck., Hist. des Aran., V, iv, female. See his Tabl. des Aran.

(3) For the remaining species of this subgenus, see the Aran. of the Faune Française. M. Walckenaer, author of that portion of the work, in his Tabl. des Aran., mentions a species enclosed in amber.

FAMILY II.

PEDIPALPI.

In the second family of the Arachnides Pulmonariæ, we find very large palpi, resembling projecting arms, terminated by a forceps or a claw; didactyle cheliceræ, one finger of which is movable; an abdomen composed of very distinct segments, without fusi at the extremity; and the sexual organs placed at the base of the abdomen. The whole body is invested with a firm tegument; the thorax consists of a single piece, and exhibits three or two simple eyes, approximated or grouped, near the anterior angles; and near the middle of its anterior extremity, or posteriorly, but in the median line, two others equally simple and approximated. There are four or eight pulmonary sacs. Those which form the genus

TARANTULA, Fab.,

Have their abdomen attached to their thorax by a pedicle, or portion of their transverse diameter; it has no pectinated laminæ at its base, nor sting at its extremity. Their stigmata, four in number, are situated near the origin of the venter, and are covered with a plate. Their cheliceræ (mandibles) are simply terminated by a movable hook. Their ligula is elongated, very narrow, and concealed. They have but two jaws, which are formed by the first joint of their palpi.

They all have eight eyes, of which three, on each side and near the anterior angles, form a triangle; and two near the middle at the anterior margin are placed on a common tubercle or little elevation, one on each side. The palpi are spinous. The tarsi of the two anterior legs differ from the others, being formed of numerous setaceous or filiform joints, and without a terminal nail.

They are confined to the hottest portions of Asia and America. Their habits are unknown to us. They now constitute two subgenera.

PHRYNUS, Oliv.

Palpi terminating in a claw; the body much flattened; thorax broad, and almost in the form of a crescent; abdomen ecaudate, and the two anterior tarsi very long and slender, resembling setaceous antennæ(1).

Thelyphonus, Lat.

The Thelyphoni are distinguished from the preceding subgenus by their shorter, thicker palpi, terminated by a forceps or by two united fingers; by their long body with its oval thorax, and the extremity of the abdomen furnished with an articulated seta forming a tail. Their anterior tarsi are short, of a uniform appearance, and composed of few articulations(2).

The others have their abdomen intimately united to the thorax throughout its entire width, presenting, at its inferior base, two movable pectiniform laminæ, and terminated by a knotted tail armed with a terminal sting. Their stigmata, eight in number, are exposed, and arranged four by four along the belly; their cheliceræ are terminated by two fingers, of which the exterior is movable. They form the genus

Scorpio, Lin., Fab.

Scorpions have an elongated body, suddenly terminated by a long slender tail formed of six joints, the last of which terminates in an arcuated and excessively acute point or sting, which affords issue to a venomous fluid contained in an internal reservoir, forming a long square, and usually marked in the middle by a longitudinal sulcus, presenting on each side, and near its anterior extremity, three or two simple eyes, forming a curved line, and near the middle of the back two others, also simple, which are approximated. The palpi are very large, with a forceps at the extremity resembling a hand; their first joint forms a concave and rounded jaw. There is a triangular appendage at the origin of each of the four anterior legs, which (appendages) by their approximation have the appearance of a quadripartite lip; the two lateral divisions, however, may be considered as a kind of jaws, the remaining two forming the ligula.

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(1) *Phalangium reniforme*, L.; Pall. Spic. Zool. fascic. IX, iii, 5, 6; Herbst. Monog. Phal., III; East Indies, the Sechelles; Herbst., Ib., IV, 1, South America; *Tarantula reniformis*, Fab.; Pall. Spic. Zool., IX, iii, 3, 4; Herbst. Ib. V, 1; ejusd. IV, 2, var.? the Antilles.

(2) *Phalangium caudatum*, L.; Pall. Spic. Zool. fascic. IX, iii, 1, 2, from Java. South America produces another species described and figured in the Jour. de Phys. et d'Hist. Nat., 1777; the inhabitants of Martinique call it the *Vinaigrier*. A third species, smaller than the preceding ones, and with fulvous feet, inhabits the peninsula beyond the Ganges.

The abdomen is composed of twelve annuli, those of the tail included; the first is divided into two parts, of which the anterior bears the sexual organs, and the other the two combs. These appendages are composed of a principal, narrow, elongated and articulated piece, movable at base, and furnished along its inner side with a suite of little hollow laminæ, united to it by an articulation, that are narrow, elongated, parallel, and similar to the teeth of a comb; their number is more or less considerable according to the species; it varies to a certain extent, and perhaps with age, in the same species. No positive experiment has yet determined the use of these appendages. The four following annuli have each a pair of pulmonary sacs and stigmata. Directly after the sixth, the abdomen becomes suddenly narrowed, and the remaining six, under the form of joints, compose the tail. All the tarsi are alike, and consist of three joints, with two hooks at the end of the last. The four last legs have a common base, and the first joint of the hip is soldered; the two last are even partly fixed against the abdomen.

The two nervous cords, proceeding from the brain, unite at intervals and form seven ganglions, the last of which belong to the tail. In all other Arachnides, there are never more than three.

The eight stigmata open into as many white bursæ, each containing a great number of very slender, small laminæ, between which it is probable that the air passes. A muscular vessel extends along the back, and communicates with each bursa by two branches(1); it also distributes vessels to every part of the animal. The intestinal canal is straight and slender. The liver is composed of four pairs of glandular clusters, which pour their humour into the intestine at four points. The male has two copulating organs arising near the combs, and the female has two vulvæ. The latter open into a matrix consisting of several inter-communicating canals, which in the proper period are found filled with living young ones; the testes are also formed of some anastomosing vessels(2).

These Arachnides inhabit the hot countries of both hemispheres, live on the ground, conceal themselves under stones and other bodies, most commonly in ruins, dark and cool places, and even in houses. They run with considerable swiftness, curving their tail over their back. They can turn it in every direction, and use it for the purposes of attack and defence. With their forceps they seize

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(1) See our preceding remarks on the circulation of the Arachnides Pulmonariæ.

(2) For the anatomy of the Scorpion, see Treviranus, Marcel de Serres, and Leon Dufour, Journ. de Phys., June 1817.

Onisci and various insects, Carabici, Orthoptera, &c., on which they feed, pierce them with their sting by directing it forwards, and then pass their prey through their cheliceræ and jaws. They are particularly fond of the eggs of Spiders and of Insects.

The wound occasioned by the sting of the *europæus* is not usually dangerous. That of the Scorpion of Souvignargues, of Maupertius, of the species which I have named Roussatre (*occitanus*), and which is larger than the preceding one, according to the experiments of Dr Maccary courageously tried upon himself, produces serious and alarming symptoms; the older the animal the more active seems to be the poison. The remedy employed is the volatile alkali, used externally and internally.

Some naturalists have asserted that the European species produce two generations in the year. That which appears to me to be the most unequivocally ascertained, occurs in August. The female in coitu is laid on her back. According to Maccary she changes her tegument previous to the production of her young. The male experiences a similar alteration at the same epoch.

The young are produced at various intervals. The mother carries them on her back for several days, during which time she never leaves her retreat, and watches over them for a month, when they are strong enough to establish themselves elsewhere and provide for their subsistence. Two years are required to qualify them for continuing their species.

Some have eight eyes; they form the genus *Buthus* of Leach.

S. afer, L., Fab.; *African Scorpion*, Rœs., Insect., 3, lxv; Herbst., Monog. Scorp., 1. Five or six inches long, and of a blackish brown; the forceps large, cordate, rough and somewhat hairy; anterior edge of the thorax deeply emarginate; thirteen teeth to each comb. From the East Indies, Ceylon.

S. roussâtre; *S. occitanus*, Amor.; *S. tunetanus*, Herbst. Monog. Scorp. III, 3; *Buthus occitanus*, Leach, Zool. Miscell., cxliii. Yellowish or reddish; tail rather longer than the body, with elevated and finely crenulated lines. Upwards of twenty-eight teeth—fifty-two to sixty-five, Maccary—to each comb. From the south of Europe, Barbary, &c.—Very common in Spain.

The others have but six eyes; they compose the genus *Scorpio*, properly so called, of the same naturalist.

S. europæus, L., Fab.; Herbst. Monog. Scorp., III, 1, 2. Brown, more or less dark; legs and last joint of the tail paler or yellowish; forceps cordate and angular; nine teeth to each comb. From the extreme southern and eastern departments of France.

ORDER II.

TRACHEARIÆ.

The Arachnides which compose this order differ from those of the preceding one in their organs of respiration, which consist of radiated or ramified tracheæ(1), that only receive air through two stigmata; in the absence of an organ of circulation(2); and in the number of their eyes, which is but from two to four(1). The want of sufficiently general anatomical observations, has prevented the limits of this order from being rigorously determined. Some of these Arachnides, the Pycnogonides for instance, exhibit no stigmata; their mode of respiration is unknown.

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(1) The tracheæ are vessels which receive the aerial fluid and distribute it to every part of the interior of the body, and thus remedy the want of circulation. They are of two kinds. Those that are *tubular* or *elastic* are formed of three membranes, the intermediate of which is composed of a cartilaginous elastic filament spirally contorted; the two others are cellular. The *vesicular* tracheæ consist of but two membranes of the latter description. They are a kind of pneumatic pouches susceptible of being inflated and depressed. Aquatic Insects, and others that are aerial, are deprived of them. They communicate with each other by tubular tracheæ. In several of the Orthoptera, where they are well developed, cartilaginous arches, formed by appendages of the inferior semi-annuli of the abdomen, give points of attachment to the muscles which form them. The branchiæ are divided into two principal trunks which extend longitudinally throughout the body, one on each side, receiving air through lateral openings or stigmata, and then throwing off numerous branches and twigs which distribute it. In several Insects, however, there are two other trunks more or less long, situated between the two preceding ones and communicating with them. M. Marcel de Serres distinguishes them by the term *pulmonary tracheæ:* the others he calls *arterial tracheæ*. He also distinguishes two sorts of stigmata: one kind, or the ordinary stigmata, simple, and consisting of two membranous lips, furnished with transverse striæ or fibres, and opening merely by contraction; the others, which he calls *trémaères*, are formed of one or two (usually two) horny, movable pieces, opening and closing like shutters. De Geer—Descript., Gryllus migratorius—compares them to eye-lids. They are peculiar to certain Orthoptera, and their position shows them to be the stigmata of the mesothorax. M. Leon Dufour—Ann. des Sc. Nat., May 1826—has given excellent figures of these various kinds of stigmata, but without employing the names of the preceding authors. It would appear from his description of the abdominal stigmata, that they have the characters of the trémaères, while those which he afterwards describes as different, are the ordinary stigmata. Our own opinion is that these differences are mere simple modifications of the lips. Reaumur, Mem., I, iv, 16, has figured a stigma of this latter kind, where the lips have an internal border, which, from all appearances, must be corneous. By supposing them to be almost entirely of this nature, we have the trémaère of M. de Serres. Certain aquatic larvæ have a peculiar respiratory apparatus, of which we shall speak hereafter.

(2) The presence of tracheæ excludes a complete circulation, that is to say,

The Trachearitæ are very naturally divided into those which are furnished with cheliceræ, terminated by two fingers, one of which is movable, or by one that is equally so; and into those where these organs are replaced by simple laminæ, or lancets, which with the ligula constitute a sucker. Most of these animals, however, being very small, great difficulties necessarily accompany these investigations, and it is readily perceived that such characters should only be resorted to when it is impossible to avoid it.

FAMILY I.

PSEUDO-SCORPIONES.

In this family we find the thorax articulated, its first segment much the largest, and resembling a corselet; the abdomen is very distinct and annulated, and the palpi very large and in the form of legs or claws. There are eight legs in each sex, with two equal hooks at the extremity of the tarsi, the two anterior ones, at most, excepted, and two apparent cheliceræ terminated by two fingers and two toes, formed by the first joint of the palpi. They are all terrestrial, and have an oval or oblong body. This family comprehends but two genera.

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the distribution of the blood to the different parts of the body, and its return from the organs of respiration to the heart. Thus, although some vessels have recently been discovered in certain Insects—Phasmæ—and, although they may possibly exist in various Arachnides Tracheariæ, it does not exclude them from the general system. M. M. de Serres has observed that the intestinal tube of the Phalangium gives off numerous cæca or vermiform appendages, which seem to have some analogy with the hepatic vessels, and that the tracheæ ramify over them ad infinitum.

(1) According to Müller the *Hydrachna umbrata* has six eyes: but may this not have arisen from an optical illusion or some mistake?

GALEODES, Oliv.—*Solpuga,* Licht., Fab.

Two very large cheliceræ, with strongly dentated vertical fingers, one superior, fixed, and frequently furnished at its base with a slender, elongated, pointed appendage(1), and the other movable; large projecting palpi in the form of feet or antennæ, terminated by a short, vesicular joint, resembling a button without a terminal hook; the two anterior feet of an almost similar figure, equally unarmed, but smaller; the others terminated by a tarsus, the last joint of which is furnished at the end with two little pellets, and two long toes terminated by a hook; five semi-infundibuliform pediculated scales on each posterior leg, arranged in one series along their first joints; and two eyes closely approximated on an eminence anterior to the first thoracic segment, which represents a large head bearing the two anterior feet, as well as the parts of the mouth.

Their body is oblong, generally soft, and bristled with long hairs. The last joint of the palpi, according to M. Dufour, contains a particular organ formed like a disk, of a nacre-white, and which never protrudes unless the animal is irritated. The two anterior feet may be considered as second palpi. The labrum has the form of a little, strongly compressed, recurved rostrum, pointed and hairy at the end. The ligula is small, shaped like a keel, and is terminated by two divergent, bearded setæ, each posted on a little joint. The other pairs of legs are annexed to as many segments. I have perceived a large stigma on each side of the body, between the first and second pair of legs, as well as a slit at the base of the inferior part of the abdomen. The abdomen is oval, and composed of nine annuli.

It is supposed that the ancients designated these animals by the names of *Phalangium*, *Solifuga*, *Tetragnatha*, &c. M. Poë discovered a species in the environs of Havana, but the others are peculiar to the hot and sandy countries of the eastern continent(2). They run with great celerity, erect their head when surprised, and show signs of resistance; they are considered venomous(3).

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(1) I do not think it is peculiar to either sex.

(2) Our author does not seem aware of the fact that two species of this genus have been discovered by Mr Say near the Rocky Mountains: they are, 1. *Gal. pallipes*, Say. Hairy; cheliceræ horizontal; fingers arcuated; abdomen sub-depressed, livid. 2. *Gal. subulata*, Id. Hairy; cheliceræ horizontal; thumb nearly rectilinear and destitute of teeth; resembles the pallipes in form, size, and colour, but the superior finger of the cheliceræ is unarmed and rectilinear, and the inferior arcuated with about two stout teeth. Long's Expedition, II, p. 3. *Am. Ed.*

(3) *Solpuga fatalis*, Fab.; Herbst., Monog., Solp. 1, i, Bengal;—*S. chelicornis*,

CHELIFER, Geoff.—*Obisium*, Illig.

The palpi elongated, in the form of an arm, with a hand terminated by a didactyle forceps; all the legs equal, terminated by two hooks; the eyes placed on the sides of the thorax.

These animals resemble small Scorpions destitute of a tail. Their body is flattened, and the thorax nearly square, with one or two eyes on each side.

They run swiftly, and frequently retrograde or move sideways like Crabs. Rœsel saw one female lay her eggs and collect them into a heap. Hermann, Sen. says that she carries them under her abdomen, united in a pellet. He is even of the opinion that these Arachnides can spin.

Hermann, Jun.—Mem. Apter.—divides this genus into two sections.

In some—*Chelifer*, Leach—the first segment of the trunk or thorax is divided by an impressed transverse line; the tarsi consist of a single joint; there is a kind of stylet at the extremity of the movable finger of the cheliceræ, and the hairs of the body are shaped like a spatula.

Ch. cancroides; Phalangium cancroides, L.; *Scorpio cancroides*, Fab.; Rœs., Insect. III, Supp. LXIV, vulgo *Book-Scorpion*. Found in herbaria, old books, &c., where it feeds on the small insects that destroy them.

Ch. cimicoides; Scorpio cimicoides, Fab.; Herm., Mem. Apter., VII, 9. Inhabits under bark of trees, stones, &c.

In others—*Obisium*, Leach—the thorax is entire, the cheliceræ are destitute of a stylet, and the hairs on the body are setaceous(1). A more important character however is found in the number of eyes. In Obisium it is four, and but two in Chelifer properly so called(2).

Fab.; Herbst. Ib.; II, 1;—*Phalangium araneoides*, Pall., Spicil. Zool., fascic. IX, iii, 7, 8, 9. See also the Monog. of this genus by Herbst., and the Voy. of Pallas and Olivier.

(1) Herm., Mem. Apter., V, 6; VI, 14.

(2) See Leach, Monog. of the Scorpions, Zool. Miscell. III, tab. 141, 142; and a memoir on the Insects found in copal by M. Dalman, where he describes and figures a species under the name of *eucarpus*, and mentions several others.

FAMILY II.

PYCNOGONIDES.

The trunk, in this family, is composed of four segments, occupying nearly the whole length of the body and terminated at each extremity by a tubular joint, the anterior of which is the largest, sometimes simple, and sometimes accompanied by cheliceræ and palpi, or only one kind of these organs, that constitutes the mouth(1). There are eight legs in both sexes, formed for running, but the female is furnished with two additional false ones, placed near the two anterior, and solely destined to carry her eggs.

The Pycnogonides are marine animals(2), analogous either to the Cyami and the Caprellæ, or to the Arachnides of the genus Phalangium, where Linnæus placed them. Their body is commonly linear, with very long legs, composed of eight or nine joints, terminated by two unequal hooks which appear to form but one, and the smallest of which is cleft. The first segment of the body, which replaces the head and mouth, forms a projecting tube, cylindrical or in the form of a truncated cone, with a triangular aperture at its extremity. The cheliceræ and palpi are placed at its base. The former are cylindrical or linear, simply prehensile, and composed of two joints the last of which is a forceps, the inferior finger or the one that is fixed being sometimes shorter than the other. The palpi are filiform, and consist of five or nine joints, with a terminal hook. Each of the following segments, the last excepted, bears a pair of legs(3); but the first, or the one arti-

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(1) On the siphon of a large species of Phoxichilus brought from the Cape of Good Hope by the late M. Delalande, I observed longitudinal sutures, so that it appears to me to be composed of the labrum, ligula, and two jaws, all soldered together. In this case the palpi belong to the jaws.

(2) According to Savigny they form the transition from the *Arachnides* to the *Crustacea*. We place them here, but with some hesitation.

(3) M. Milne Edwards, who has investigated the anatomy of these animals on the living subject, has told me that in the interior of these organs he observed

culated with the mouth, has a tubercle on the back, on which are placed two eyes on each side, and beneath, in the females only, two additional small folded legs, bearing the eggs which are collected around them in one or two pellets. The last segment is small, cylindrical and perforated by a little orifice at the extremity. No vestige of stigmata can be perceived.

They are found among marine plants, sometimes under stones near the beach, and occasionally also on the Cetacea.

PYCNOGONUM, Brun., Mull., Fab.

The chelicerae and palpi wanting; length of the feet hardly greater than that of the body, which is proportionably thicker and shorter than in the following genera. They live on the Cetacea(1).

PHOXICHILUS, Lat.

The palpi wanting, as in the Phoxichili; but the legs are very long, and there are two chelicerae(2).

NYMPHON, Fab.

The Nymphones resemble the Phoxichili in the narrow and oblong form of their body, the length of their legs, and in the presence of chelicerae; but they have, besides, two palpi(3).

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lateral expansions of the intestinal canal, or cæca. I have, in fact, observed traces of them under the form of blackish vessels, in various Nymphones. This induces me to believe that these animals respire by the skin, a character by which we might form them into a particular order, and one perhaps intermediate between the Arachnides and Apterous Insects of the order of the Parasita.

(1) Müll. Zool. Dan., CXIX, 10—12, the female. Found on our coast by MM. Surirey and d'Orbigny.

(2) Refer to this genus the *Pycnogonum spinipes* of Othon Fabricius, his variety of the *P. grossipes*, without antennæ; the *Phalangium aculeatum;* the *spinosum* Montag., Lin. Trans.; the *Nymphon femoratum* of the Acts of the Soc. of Nat. Hist. of Copenhag., 1797; the *Nymphon hirtum*, Fab., which perhaps does not differ from the *Phal. spinipes* and *spinosum* above quoted.

(3) *Pycnogonum grossipes*, Oth. Fab.; Müll., Zool. Dan., CXIX, 5—9, the female; to compare with the *Nymph. gracile* and *femoratum*, Leach, Zool. Miscell., XIX, 1, 2. His genus *Ammothea*—*A. carolinensis*, Ib.—differs from Nymphon in the chelicerae which are much shorter than the mouth, the first segment or radical joint being very small. The palpi consist of nine joints, while those of the Nymphones have but five. In this genus, as well as in *Phoxichilus* and *Pycnogonum*, the second joint of the tarsi is very short. The tubercle on which the eyes are placed, is sometimes situated on an elevation which projects above the base of the anterior segment or the mouth.

FAMILY III.

HOLETRA(1).

The trunk and abdomen are here united in one mass, under a common epidermis, or at most, the thorax is divided by a strangulation, and the abdomen, in some, merely exhibits an appearance of annuli, formed by the plicæ of the abdomen.

The anterior extremity of their body frequently projects in the form of a snout or rostrum; most of them have eight legs, and the remainder six(2).

This family consists of two tribes. In the first or the **PHALANGITA**, Lat., we observe very apparent chelicerae which either project in front of the trunk, or are inferior, and always terminating in a didactyle forceps, preceded by one or two joints.

They have two filiform palpi, composed of five joints, the last of which is terminated by a small nail; two distinct eyes; two jaws formed by the prolongation of the radical joint of the palpi, and frequently four more(3), which are also a mere dilatation of the hip of the two first pairs of legs. The body is oval or rounded, and covered, the trunk at least, with a firmer skin; there is also an appearance of annuli or plicæ on the abdomen. The legs, of which there are always eight, are long, and distinctly divided, like those of Insects(4). At the origin of the two posterior legs, at least in several—Phalangium—are two stigmata, one on each side, but hidden by their hips.

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(1) HOLETRA, Hermann.

(2) The *Trombidium longipes*, Hermann, Jun., Mem. Apter., pl. I, 8, is represented with ten legs, the two first very long. He allows but eight in the text.

(3) If we suppose that the two superior jaws, with their palpi, represent the mandibles of the Crustacea Decapoda, the other four will also represent the jaws of the same animals, and the two jaws and inferior lip of the triturating (*Broyeurs*) Insects. From M. Marcel de Serres we learn that the ganglion which immediately follows the brain, is opposite to the third pair of legs, which, according to these approximations, are analogous to the first pair in Insects; now, there also we find the same ganglion in the latter. See Myriapoda.

(4) The hips, thighs, tibiæ, and tarsi are the same as in the preceding families. But the legs of the Arachnides Trachearïæ are composed of short joints, whose rela-

Most of them live on the ground, at the foot of trees, and on plants, and are very active; others conceal themselves under stones and in moss. Their sexual organs are internal, and placed under the mouth.

PHALANGIUM, Lin., Fab.

The cheliceræ projecting, much shorter than the body; eyes placed on a common tubercle.

Their legs are very long and slender, and when detached from the body show signs of irritability for a few moments. The two sexes in coitu are placed opposite to each other; this occurs at the latter end of summer. The penis of the male is formed like a dart, and has a demi-sagittal termination. The female has a filiform, flexible, annulated and membranous oviduct. The tracheæ are tubular.

> *Ph. cornutum*, L., the male; *Opilio*, Id., the female; Herbst., Monog. Phal., I, 3, the male; Ib., 1, the female. Body oval, reddish or cinereous above; black beneath; palpi long; two ranges of small spines on the ocular tubercles, and spines on the thighs; corneous cheliceræ in the males; a blackish band with a festooned margin on the back of the female(1).

A celebrated English entomologist, M. Kirby, under the name of GONOLEPTES, has formed a particular genus of the species with spinous palpi, the two last joints of which are nearly equal, sub-oval, and terminated by a stout nail, and in which the hips of the two posterior legs are very large, soldered, and form a plate under the body. These legs are separated from the others and placed behind(2). In Phalangium properly so called, the palpi are filiform, spineless, and terminated by a joint much longer than the preceding one, with a little terminal hook. All the legs are approximated, with similar coxæ contiguous at their origin. Such are all the species indigenous to Europe.

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tive proportions differ very gradually, so that these distinctions of parts are less apparent.

(1) See the Monograph of this genus, published by Latreille at the end of the Histoire des Fourmis, and those of Herbst., and Hermann, Jun., Mem. Apter.

(2) *Gonoleptes horridus*, Lin. Trans., XII, xxii, 16; from Brazil.

Siro, Lat.

Projecting chelicerae nearly as long as the body; eyes separated and placed on different insulated tubercles(1).

Macrocheles, Lat.

Extremely salient and very long chelicerae; but the eyes null or sessile; the two anterior legs very long and antenniform; the top of the body forming a plate or scale without distinct annuli.

To this genus I refer the *Acarus marginatus* and the *Ac. testudinarius*, of Hermann, Jun., Mem. Apter., p. 76, pl. vi, fig. 6, and p. 80, pl. ix, fig. 1.

Trogulus, Lat.

Anterior extremity of the body projecting like a clypeus, and receiving the chelicerae and other parts of the mouth into an inferior cavity.

The body is flat and covered with a very firm skin(2).

In the second tribe of the Holetra, that of the Acarides, we sometimes find chelicerae, but they are simply formed of a single forceps, either didactyle or monodactyle, and are hidden in a sternal lip; sometimes there is a sucker formed of united lancets; or finally the mouth consists of a simple cavity without any apparent appendages. This tribe is composed of the genus

Acarus, Lin.

Most of these animals are very small or nearly microscopical. They are observed everywhere. Some of them are errant, and of these some are found under stones, leaves, the bark of trees, in the earth, in water, dried meat, old cheese, and putrescent animal matters. Others are parasitical, living on the skin or in the flesh of various animals, which they often, by their excessive multiplication, reduce to a state of great debility. The origin of certain diseases, such as the itch, is attributed to particular species. The experiments of Dr Galet prove that if the Acari of the human psora be placed on the body of a perfectly healthy person, they will inoculate him with the virus of that disorder. Various species of Acari are also found on Insects, and some of the Coleoptera that feed on cadaverous or excrementitious substances are frequently covered with them. They have even been observed in the brain and eye of Man.

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(1) *Siro rubens*, Lat., Gener. Crust. et Insect., I, vi, 2;—*Acarus crassipes*, Herm., Mem. Apter., III, 6, and IX, Q. N.

(2) *Trogulus nepæformis*, Lat. Gener. Crust. and Insect., I, vi, 1; *Phalangium tricarinatum*, L.—South of France, Spain.

The Acari, or Mites as they are vulgarly termed, are oviparous, and excessively prolific. Several of them at first have but six legs, the remaining two being developed shortly after. Their tarsi terminate in various ways according to their habits.

Some—ACARIDES, Lat.—or the Acari proper, have eight legs, solely deſtined for walking, and cheliceræ.

TROMBIDIUM, Fab.

The cheliceræ monodactyle, or terminated by a movable hook; salient palpi, pointed at the end, with a movable appendage or species of finger under their extremity; two eyes, each placed on a little immovable pedicle. The body is divided into two parts, the first of which, or the anterior, is very small, and bears the two first pair of legs, together with the eyes and mouth.

Tromb. holosericeum, Fab.; Herm., Mem. Apter., pl. I, 2, and II, 1. Very common in gardens in the spring; blood-red; abdomen nearly square, posteriorly narrowed, with an emargination; the back loaded with papillæ, hairy at base, and globular at the extremity.

Tromb. tinctorium, Fab.; Herm. Apter., I, 1. Three or four times the size of the preceding; it furnishes a red dye. The East Indies(1).

ERYTHRÆUS, Lat.

The cheliceræ and palpi of Trombidium; but the eyes are not placed on pedicles, neither is the body divided(2).

GAMASUS, Lat. Fab.

Didactyle cheliceræ; very distinct or projecting filiform palpi.

The superior surface of the body, in some, is either wholly or partially invested with a scaly skin(3).

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(1) *T. fuliginosum*, Herm. Mem. Apt. I, 3;—*T. bicolor*, Ib. II, 2;—*T. assimile*, Ib., 3; *T. curtipes*, Ib., 4;—*T. trigonum*, Ib., 5;—*T. trimaculatum*, Ib., 6.

(2) *Erythræus phalangioides*, Lat.; *Trombidium phalangioides*, Herm., Ib., I, 10;—*Trombidium quisquiliarum*, Ib., 9;—*Tromb. parietinum*, Ib., 12;—*T. pusillum*, Ib., II, 4;—*T. murorum*, Ib., 5.

(3) *Gamasus marginatus*, Lat.: *Acarus marginatus*, Herm., Mem. Apter., VI, 6,

The body is entirely soft in the remainder. Several species of this division live on Birds and Quadrupeds. Some are known; such as the

Gam. telarius; *Ac. telarius*, Fab.; which form extremely fine webs on the leaves of several plants, particularly of the Elm, and are very injurious to them. This particular species is reddish, with a blackish spot on each side of the abdomen.

Cheyletus, Lat.

Didactyle cheliceræ; but the palpi are thick, resemble arms, and have a falciform termination(1).

Oribata, Lat.—*Notaspis*, Herm.

The chelicerae are also didactyle in the Oribatæ, but their palpi are very short or concealed; their body is invested by a firm, coriaceous or scaly skin resembling a shield, and their legs are long or moderate.

The anterior part of the body projects into a snout, and an appearance of a thorax is often observable. The tarsi, in some, are terminated by a single hook, and in others by two or three, without any vesicular pellet.

They are found on stones, trees, and in moss; their gait is slow(2).

Uropoda, Lat.

Judging from analogy, we presume that the Uropodæ are furnished with forceps-like chelicerae. Their palpi are not apparent; their body, still covered with a scaly skin, has but very short legs, and a filament at the anus, by means of which they attach themselves to certain coleopterous Insects, suspending themselves in the air(3).

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found on the corpus callosum of the human brain;—*Trombidium longipes*, Herm., Ib., I, 8;—*Acarus coleoptratorum*, Fab.; De Geer, Mem. Insect., VII, vi, 5;—*Acarus hirundinis*, Herm., Ib., I, 13;—*Ac. vespertilionis*, Ib., 14;—*Trombidium bipustulatum*, Ib., II, 10;—*Tromb. socium*, Ib., II, 13;—*Tromb. tiliarium*, Ib., 12;—*Tromb. telarium*, Ib., 15: these three species live in society on leaves, covering them with extremely fine and silky filaments;—*Tromb. celer*, Ib., 14;—*Acarus gallinæ*, De Geer, Insect., VII, vi, 13.

(1) *Acarus eruditus*, Schrank., Enum. Insect. Aust., No. 1058, Tab. II, 1; ejusd., *peciculus musculi*, Ib., No. 1024, I, 5.

(2) See Hermann, Mem. Apter., genus Notaspis; and Olivier, Encyc. Method., Insect., article Oribate.

(3) *Acarus vegetans*, De Geer, Insect., VII, vii, 15. The *Acarus spinitarsus*, Herm. Mem. Apter. VI, vi, 5, perhaps forms a genus intermediate between this and the preceding one.

ACARUS, Fab. Lat.—*Sarcoptes*, Lat.

Two didactyle cheliceræ, and very short or concealed palpi, as in the preceding; but the body very soft or without a scaly crust.

The tarsi have a vesicular pellet at their extremity. Several species live on the food of Man, and others are found in his psoraic ulcers, and in those of the Horse, Dog, and Cat(1).

Others, called Ticks—RICINIÆ, Lat.—also have eight legs, solely adapted for running, but are destitute of cheliceræ, properly so called; they are replaced, however, by two lancet-like blades, which, with the ligula, form a sucker.

Sometimes they have distinct eyes, and salient, filiform, free palpi; a sucker composed of membranous parts, and entire; and a very soft body. They are errant animals.

BDELLA, Lat. Fab.—*Scirus*, Herm.

Elongated palpi, bent into an elbow, with setæ or hairs at the extremity; four eyes; the posterior legs longest; sucker projecting in the form of a conical or subulate rostrum. Found under stones, bark of trees, and in moss.

> *Bd. longicornis*; *Acarus longicornis*, L.; *La Pince rouge*, Geoff.; *Scirus vulgaris*, Herm., Mem. Apter., III, 9; IX, S. Hardly half a line in length; scarlet; the feet paler; sucker in the form of an elongated and pointed rostrum; quadriarticulated palpi, the first and last joint of which are the longest; the latter somewhat the shortest of the two, and terminated by two setæ. Common in the environs of Paris; under stones(2).

SMARIDIA, Lat.

Distinguished from Bdella by the palpi, which are hardly longer than the sucker, straight and without terminal setæ; by the eight eyes, and by the two anterior legs, which are longer than the others(3).

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(1) *Acarus domesticus*, De Geer, Ib., V, 1—4;—*Acarus siro*, Fab.;—*Ac. scabiei*, Ib., 12, 13. See the dissert. of Dr Galet;—*Ac. farinæ*, Ib., 15;—*Ac. avicularum*, Ib., VI, 9;—*Ac. passerinus*, Ib., 12, remarkable for the size of its third pair of legs;—*Ac. dimidiatus*, Herm., Mem. Apter., VI, 4;—*Trombidium expalpe*, Ib., II, 8.

(2) *Scirus longirostris*, Herm., Mem. Apter. VI, 2;—*S. latirostris*, Ib., II, III;—*S. setirostris*, Ib., III, 12; IX, T.

(3) *Acarus sambuci*, Schrank, and perhaps the following Trombidia of Hermann; *Tr. miniatum*, 1, 7;—*Tr. papillosum*, II, 6;—*Tr. squammatum*, Ib., 7. The second is even closely allied to the species which serves as a type to the genus.

Sometimes these Ticks, with eight legs and without cheliceræ, have no eyes that are perceptible; their palpi are either anterior and projecting, but in the form of valvulæ, widened or dilated near the extremity, serving as a sheath to the sucker—or inferior; the parts composing the sucker are horny, very hard and dentated; the body is invested with a coriaceous skin, or has at least, anteriorly, a scaly plate.

These animals are parasitical, gorge themselves with the blood of several of the Vertebrata, and from being extremely flat, acquire by suction a great volume and a vesicular form. They are round or oval.

IXODES, Lat. Fab.—*Cynorhæstes*, Herm.

The palpi forming a sheath to the sucker, and with it constituting a projecting and short rostrum, truncated and slightly dilated at the extremity.

The Ixodes are found in thick woods abounding in brushes, briars, &c.; they hook themselves to low plants by the hind legs, keeping the others extended, and fasten on Dogs, Oxen, Horses and other Quadrupeds, and even on the Tortoise, burying their sucker so completely in their flesh, that they can only be detached by force, and by tearing out the portion that adheres to it. They lay a prodigious quantity of eggs, which, according to M. Chabrier, are protruded from their mouth. They sometimes increase to such an enormous extent on the Ox and Horse, that they perish from the exhaustion. Their tarsi are terminated by two hooks inserted in a palette, or united at base on a common pedicle.

The ancients designated these Arachnides by the term *Ricinus*. Huntsmen in France call the species which attaches itself to the Dog, *Louvette*. It is the

Ixodes ricinus; *Acarus ricinus*, L.; *Acarus reduvius*, De Geer, Insect., VII, vi, 1, 2. A deep blood-red; the scaly, anterior plate still darker; sides of the body turned up, and slightly hairy; palpi forming a sheath to the sucker.

Ixodes reticulatus, Lat. Fab.; *Acarus reduvius*, Schrank, Enum. Insect., Aust., No. 1043, iii, 1, 2: *Cynorhæstes pictus*, Herm. Cinereous, with small reddish-brown spots, and little annular lines of the same colour; edges of the abdomen striate; palpi nearly oval. It infests Oxen, and when tumefied, is six lines in length.

The species of this genus have not been sufficiently studied(1).

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(1) *Acarus ægyptius*, L.; Herm. Mem. Apter., IV, 9; L. IV, 13;—*Acarus rhinocerotis*, De Geer, Insect., VII, xxxviii, 5, 6;—*Acarus americanus*, L.;—*Ac. nigua*,

ARGAS, Lat.—RHYNCHOPRION, Herm.

Distinguished from Ixodes by the inferior situation of the mouth, and by the palpi which do not encase the sucker, have a conical form, and are composed of four joints, and not of three, as in the preceding genus.

Argas reflexus; Ixodes reflexus, Fab.; Lat. Gen. Crust. et Insect., I, vi, 3, Herm. Mem. Apt. IV, 10, 11. Pale yellow, with dark blood-coloured, or obscure and anastomosing lines.—On Pigeons.

Argas persicus; Malleh de Mianeh. This species, described by travellers under the name of *Punaise venimeuse de Miana*, with other Ixodes, constitutes the subject of some curious observations published by M. Gotthef Fischer de Waldheim.

Others again—HYDRACHNELLÆ, Lat.—have also eight legs, but they are ciliated and adapted to natation.

They form the Genus HYDRACHNA of Müller(1) or that of *Athax* Fab., and are wholly aquatic. Their body is generally oval or nearly globular, and very soft. That of some males is narrowed posteriorly, so as to resemble a kind of tail, their genital organs being placed at its extremity; in the female, they are on the inferior surface of the abdomen. The number of eyes varies from two to four, or, according to Müller, even to six.

The mouth of those species, I have been able to study, offered the three following modifications, which have served as a base to three generic divisions, but to which it is almost impossible to refer all Müller's species of Hydrachnæ, that naturalist not having described them with sufficient minuteness.

EYLAIS, Lat.

Cheliceræ terminated by a movable hook(2).

HYDRACHNA, Lat.

The mouth composed of laminæ, forming a projecting sucker; a movable appendage under the extremity of the palpi(3).

De Geer, Ib., XXVII, 9, 13. See the genus Ixodes of Fabricius, and the work of Leach on the apterous Insects of Linnæus—Trans. Lin. Soc., XI.

(1) *Hydrachna*, Herm.

(2) *Atax extendens*, Fab.; Müll., IX, 4.

(3) *Atax geographicus*, Fab.; Müll., VIII, 3, 5;—*At. globator*, Fab.; Müll., IX, 1.

LIMNOCHARES, Lat.

The sucker mouth of the Hydrachnæ, but the palpi are simple(1).

Others,—MICROPHTHIRA, Lat.—are removed from all the rest of the Arachnides by the number of their legs, which only amounts to six. They are all parasitical.

CARIS, Lat.

A sucker and apparent palpi; the body rounded, flat, and covered with a scaly skin(2).

LEPTUS, Lat.

A sucker and palpi as in Caris, but the body very soft and ovoid.

Leptus autumnalis; *Acarus autumnalis*, Shaw, Zool. Miscell., II, pl. xlii. A very common species, in autumn, on grasses and other plants. Having reached the person of the passenger, it climbs up, insinuates itself into his skin at the root of the hairs, and occasions an itching as intolerable as that produced by a regular itch. It is called the *Rouget* in France, and in fact it is of a reddish colour and very small.

The remaining species are found on different Insects, and belong to the division of the *Trombidia hexapoda*, Hermann(3).

ACLYSIA, Aud.

The body shaped like a bagpipe, and furnished with a siphon, without distinct palpi, situated beneath its anterior extremity, which is narrowed, curved and obtuse; very small legs.

The Aclysiæ live on the Dytisci. But a single species—*Ac. dytisci*, Mém. de la Soc. d'Hist. Nat., I, p. 98, pl. v, fig. 2—was at first known, the one on which M. Victor Audouin established the subgenus. Count Manheiren, a Russian naturalist, to whom the science is much indebted for his entomological essays, and his readiness to second the efforts of those who study it, has, as it appears, discovered another.

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(1) *Acarus aquaticus*, L.;—*Acarus aquaticus holosericeus*, De Geer, Insect., VII; ix, 15, 20;—*Trombidium aquaticum*, Herm., Mem. Apter. I, ii.

(2) *Caris vespertilionis*, Lat., Gener. Crust. et Insect. I, 161.

(3) *Trombidium insectorum*, Herm., Mem. Apter. I, 16; De Geer, Insect., VII, vii, 5;—*Tromb. latirostre*, Herm., Ib., 15;—*Tromb. cornutum*, Ib., II, ii;—*Tromb. aphidis*, Ib.; De Geer, Insect., VII, vii, 14;—*Tromb. libellulæ*, Herm. Ib.; De Geer, Ib., VII, 9;—*Tromb. culicis*, Herm. Ib.; De Geer, Ib., VII, 12;—*Tromb. lapidum*, Herm., Ib., VII, 7.

ATOMA, Lat.

Neither sucker nor palpi visible, the mouth merely consisting of a small orifice on the chest. The body is oval and soft, the legs very short(1). The

OCYPETE, Leach,

Belongs to this tribe by the number of legs; but, according to him, these animals are furnished with mandibles(2).

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(1) *Acarus parasiticus*, De Geer, VII, vii, 7;—*Trombidium parasiticum*, Hermann.

(2) *Ocypete rubra*, Leach, Lin. Trans., XI, 396. On the Tipulæ.

CLASS III.

INSECTA.

Insects, which form the third class of articulated animals provided with articulated legs, have, besides, a dorsal vessel analogous to the vestige of a heart, but totally destitute of any branch for the circulation(1). They respire by means of two principal tracheæ, extending, parallel to each other, throughout the whole length of the body, having centres, at intervals, from which proceed numerous branches, corresponding to external openings or stigmata(1), which ad-

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(1) Anatomists are greatly divided with respect to the nature of this organ; some consider it as a true heart; others, among whom is the Baron Cuvier, deny it this quality, an opinion which appears to us to be fully confirmed by the admirable researches of M. Marcel de Serres—"Memoire sur le Vaisseau Dorsal des Insectes"—published in the Mém. du Mus. d'Hist. Nat. According to the latter it secretes fat, which is subsequently elaborated in the adipose tissue which surrounds it. Lyonet says that it contains a gummy substance of an orange colour. Some very recent observations appear to establish the existence of certain very small vessels; but in addition to the fact that this circulation must be very partial, Insects would still greatly differ, in this respect, from the Crustacea, inasmuch as the blood does not return to the heart. M. Straus in his report—Bullet. Univers., de M. le Baron de Férussac—on a Memoir of M. Hérold on this subject, has intimated his own opinion on the matter as deduced from his anatomical investigations of the Melolontha. "The dorsal vessel," says that gentleman, "is the true heart of Insects, being, as in the higher animals, the locomotive organ of the blood, which, instead of being contained in vessels, is diffused throughout the general cavity of the body. This heart occupies all the length of the back of the abdomen, and terminates anteriorly by a single non-ramified artery which carries the blood into the head where it diffuses it, and whence it returns into the abdomen in consequence of its accumulation in the head, to again enter the heart; to this all the circulation in Insects is reduced, they having merely a single artery without branches and no veins. The alæ of the heart are not muscular as is asserted by Hérold: they are mere fibrous ligaments which keep the dorsal vessel in its place. The heart, that is to say the abdominal part of the vessel (in the *Melolontha vulgaris*) is divided, internally, into eight chambers separated from each other by two converging valvulæ which allow the transmission of the blood from behind forwards, and from one chamber to another, into the artery which

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runs to the head, but which prevent it from retrograding. At the lateral and anterior part of each chamber, are two transverse fissures which communicate with the abdominal cavity and through which the blood contained in the latter enters the heart. Each of these apertures is provided, internally, with a little semi-circular valve which presses on it during the systole of the heart. From this short description it will be seen, that when the posterior chamber dilates, the blood contained in the abdominal cavity penetrates into it by the transverse fissures of which we have spóken, and which we call *auriculo-ventriculaires*. When the chamber contracts, the blood finding no exit into the abdominal cavity forces the inter-ventricular valve, passes into the second chamber which dilates to receive it, and which, at the same time, receives a certain quantity of blood by the true auriculo-ventricular apertures. When the second chamber receives the contracting impression, the blood passes into the third, which also receives a portion of it through the lateral openings, and thus the blood is forced from one chamber to another into the artery. It is these successive contractions of the chambers of the heart that we perceive through the skin of caterpillars." The heart of the Crustacea Decapoda, Squillæ, Limuli, Araneæ, &c., as I have been assured by the same profound observer, also contains similar valvulæ. It is enclosed in a sort of sac or pericardium, which, according to him, acts in lieu of an auricle. These divisions or chambers of the dorsal vessel are what Lyonet terms *ailes* or wings; he also saw that the dorsal vessel extended to the head, and terminated there in the manner already described: but he did not see the orifices and valvulæ mentioned by Straus. The definition of the dorsal vessel given by this naturalist, evidently proves, that, whatever be its internal formation, it is not a true heart. Besides, these observations do not teach us the true nature of the liquid it contains, nor how it becomes diffused throughout the other parts of the body to effect their nutrition. It is however certain, from the observations of Lyonet, that all the parts of the body communicate with the *corps graisseux* by means of fibrilli. The tracheæ give off branches which extend to the extremities of the various appendages of the body. The action of the air may occasion the ascension of the nutritive juices in the interstices, forming a sort of capillary tubes.

(1) The number of segments in the body of the Myriapoda being undetermined, that of their stigmata is the same, and frequently extends to above twenty. In the Hexapoda it is frequently eighteen, nine on each side. This computation, however, is rather true with respect to the animal as a larva than in its perfect state. Caterpillars, the larvæ of the Coleoptera and those of various other Insects, have one pair of stigmata on the first segment, or the one that bears the first pair of legs; the second and the third are destitute of them, owing, I presume, to the development of the wings which occurs in these rings, and renders the presence of respiratory apertures useless in that particular place. The fourth and each of the seven following annuli exhibit a pair: but in coleopterous Insects in their perfect state, besides the two anterior stigmata concealed in the cavity of the pro-thorax, which had not been perceived, we observe two others, situated between the origin

mit air. They all have two antennæ and a distinct head. The nervous system of most Insects—the Hexapoda—is generally composed of a brain formed of two opposing ganglions, united at base, giving off eight pairs of nerves and two single ones, and of twelve ganglions(1), all inferior. The two first are situated near the junction of the head with the thorax, and are longitudinally contiguous; the anterior sends nerves to the lower lip and adjacent parts; the second, third and fourth belong to each of the three first segments, or those which form the thorax in the Hexapoda; the remaining ganglions belong to the abdomen, so that the last or the twelfth corresponds to its seventh ring, and is immediately followed by those which compose the organs of generation; each of these ganglions transmits nerves to the parts of its respective segments. The two last, which are closely approximated, also send some to the terminal annuli of the body. The frontal region exhibits three particular ganglions called *frontal* by Lyonet, from the first of which arises posteriorly a great nerve with enlargements, the longest of all, that he denominates the *recurrent*. The first ordinary or sub-œsophagean

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of the elytra and that of the wings: they belong to the mesothorax. There are none in the metathorax, unless we consider the two of the first abdominal segment, as supplementary to the thorax, a consideration founded on what occurs in the Diptera and Hymenopterous Insects with a pediculated abdomen, where these two stigmata, with the semi-segment in which they are placed, make part of the thorax. Thus, generally speaking, the hexapoda have eight pairs of abdominal stigmata, the two last of which, however, are frequently obliterated.

In Acrydium, Truxalis, and Libellula, each side of the mesothorax presents a stigma, or those which Marcel de Serres calls *trémaeres*. In these latter Insects, as well as in others with naked wings, or without elytra, the two first thoracic stigmata are placed above, between the prothorax and the mesothorax. With the exception of the Libellulæ, the thorax proper offers no other distinct stigmata—I say thorax proper, because, as we have already observed, the two first of the abdomen, in several, are referable to the posterior extremity of the thorax. The metathorax of the Pentatomæ, and Scutelleræ is provided inferiorly with a pair of stigmata. In the apterous Spectra, there is none in the second segment or mesothorax; but in the following one, or the metathorax, there are two pairs, one anterior, which being situated near the articulation of this segment with the preceding, may be considered as belonging to the latter, and the other smaller, and placed close to that of the first abdominal segment.

(1) Several of the Lamellicornes in a perfect state form exceptions.

ganglion, gives off, according to him, four pairs of nerves, and each of the following ones, two; so that by counting the eight pairs of the brain, and the ten spinal bridles, which may also be considered as so many pairs of nerves, we shall have in all forty-five pairs, exclusive of the two solitary nerves above-mentioned, or from twelve to fourteen more than are found in the human subject. The two nervous cords which form the ganglions by their union, are tubular and composed of two tunicks, in the exterior of which we observe tracheæ; a medullary substance fills the central canal. The admirable work of M. Herold on the anatomy of the larva of the great *Papilio brassicæ*, L., studied throughout its various degrees of development, and to the period of its transformation into a chrysalis, shows us that the nervous system and that of the digestive organs experience remarkable changes; that in the beginning, the nervous cords are longer and further apart, an observation which strengthens the opinion of one of the greatest zootomists of the age, Doctor Serres, on the origin and development of the nervous system. In our general remarks on points common to the three classes of articulated animals provided with articulated feet, we mentioned the various opinions of physiologists with respect to the seat of the sense of hearing and of smell. We will merely add, in regard to the former, that the little nervous frontal ganglions of which we have spoken, seem to confirm the opinion of those who, like Scarpa, place it in the origin of the antennæ. I have detected two small orifices near the eyes of certain Lepidoptera, which, perhaps, are auditory canals. If, in several Insects, particularly those furnished with filiform, or long, setaceous antennæ, they (the antennæ) are organs of touch, it seems to us difficult to account for the extraordinary development they acquire in certain families, and more particularly in the males, if we refuse to admit that they are then the seat of smell. The palpi also, in some cases, as when they are greatly dilated at the extremity, may possibly be the principal organs of smell, part of which sense may also perhaps belong to the ligula.

The digestive system consists of a preparatory or buccal apparatus, intestinal canal, biliary vessels, also called *hepatic vessels*, those styled *salivary*, but which are less general, free and floating vessels called excrementitious, the epiploon or *corps graisseux*, and probably of the dorsal vessel. This system is singularly modified according to the difference of the aliment, or forms a great number of particular types, of which we shall speak when treating of families. We will merely say a word with respect to the buccal apparatus and the principal divisions of the intestinal canal, beginning with the latter. In those where it is the most complicated, as in the carnivorous Coleoptera, we observe a pharynx, œsophagus, crop, gizzard, stomach or chylific ventricle, and intestines which are divided into the small intestines, great intestine or cæcum, and the rectum. In those Insects where the tongue, properly so called, is laid on the anterior or internal face of the lip, or is not free, the pharynx is situated on that same face, and this is most commonly the case(1). We will also add, that a naturalist who first furnished us with correct observations on the respiratory organs of the Mygales, M. Gaede, professor of natural history at Liege, does not consider the biliary vessels as secreting organs—this opinion, however, does not appear to be sufficiently well founded, and the observations of M. Leon Dufour(2) even seem to destroy it.

Some few, and always apterous Insects, such as the Myriapoda, approximate to several of the Crustacea, either in the number of the annuli of their body and in their legs, or in some points of analogy in the conformation of the parts of the mouth; but all the others never have more than six legs, and their body, the number of whose segments never extends beyond twelve, is always divided into three principal parts, the *head*, *trunk* and *abdomen*. Among the latter Insects, some are found without wings, that always preserve their natal form, and merely increase in size and change their skin(1). In this respect they bear some analogy to the animals of the preceding classes. Nearly all the remaining Hexapoda have wings; but these organs, and even frequently the feet, do not make their appearance at first, but are only developed after a series of changes, more or less remarkable, styled *metamorphoses*, of which we shall soon have to speak.

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(1) See what we have stated respecting the ligula, in our general remarks on the three classes.

(2) This latter naturalist, whom I shall have frequent occasion to mention, has published, with the most minute detail, every thing relative to the digestive system of Insects, in a series of admirable Memoirs, which have enriched the Annales des Sciences Naturelles. A well arranged resumé of the whole by M. Victor Audouin may be found in the Dict. Class. d'Hist. Nat., article INSECTES.

The head(2) bears the *antennæ*, *eyes*, and *mouth*. The composition and form of the antennæ are much more various than in the Crustacea, and are frequently more developed or longer in the males than in the females.

The eyes are either compound or simple; the first, according to the baron Cuvier, Marcel de Serres and others, are formed: 1, of a cornea, divided into numerous little facets, which is so much the more convex, as the insect is more carnivorous; its internal surface is covered with an opaque, and variously coloured, but slightly fluid substance, usually, however, of a black or deep violet hue; 2, of a choroides, fixed by its contour and edges to the cornea, covered with a black varnish, exhibiting numerous air vessels, arising from tolerably large trunks of tracheæ in the head, whose branches form a circular trachea round the eye: it is frequently wanting, however, as well as the choroides, in various nocturnal insects; 3, of nerves arising from a large trunk, proceeding directly from the brain, which then opens, forming a reversed cone, the base of which is next to the eye, and each of whose rays or threads traversing the choroides and lining matter of the cornea, terminates in one of its facets; there is no crystalline nor vitreous humour.

Several, besides these compound eyes, have simple ones, the cornea of which is smooth. They are usually three in number, and are disposed in a triangle on the top of the head. In most of the Aptera and in the larvæ of those that are winged, they replace the former, and are frequently united in a group; those of the Arachnides seem to indicate that they are fitted for the purposes of vision.

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(1) My *Homotenes* (similar to the end) or the *Ametobolia* of Leach.

(2) Its surface is divided into several little regions or areæ called the *clypeus* (nose of Kirby), the *face*, the *front*, the *vertex* or *summit*, and the *cheeks*. The term clypeus being equivocal, I have substituted for it that of *epistoma* or over-mouth. It gives insertion to the labrum or upper lip.

The mouth of hexapodous insects is generally composed of six principal parts, four of which are lateral, are disposed in pairs, and move transversely; the other two, opposed to each other in a contrary direction, occupy the space comprised between the former: one is placed above the superior pair, and the other beneath the inferior. In the triturating insects (broyeurs), or those which feed on solid matters, the four lateral parts perform the office of jaws, the other two being considered as lips; but, as we have already observed, the two superior jaws have been distinguished by the peculiar appellation of *mandibles*, the others alone bearing that of maxillæ or *jaws;* the latter are also furnished with one or two articulated filaments called *palpi*, a character never exhibited, in this class, by the mandibles. Their extremity is often terminated by two divisions or lobes, the exterior of which, in the Orthoptera, is called the *galea*. We have already said that the upper lip was called the *labrum*. The other, or the labium properly so styled, is formed of two parts; the one, inferior and solid, is the *mentum* or chin; the other, which is usually provided with two palpi, is the *ligula*(1).

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(1) With respect to this, see what is stated in the general remarks which precede the particular exposition of each class. The inferior lip appears to us to be a mere modification of the second jaws of the Crustacea Decapoda, combined with their ligula. The changes gradually effected in these parts in the Crustacea, Arachnides, and Myriapoda, seem to authorize this idea. According to this hypothesis, the six thoracic legs are analogous to the foot-jaws, a fact already recognized with regard to the Crustacea of the genus *Apus*. The five first abdominal segments of the Hexapoda will then represent those, which, in the Crustacea Decapoda, bear the legs properly so called, or the third and four following pairs of the Amphipoda and Isopoda. All the observations that have been published on the thorax of Insects, although otherwise useful, will necessarily be liable to continual changes, when that part of the body is compared in the three classes of articulated animals provided with articulated feet. In this respect our nomenclature is far from being fixed.

In the Suctoria, or those that live by the suction of fluid aliment, these various organs of manducation present themselves under two kinds of general modifications. In the first, the mandibles and the jaws are replaced by little laminæ in the form of setæ or lancets, forming, by their union, a sort of sucker, which is received into a sheath, supplying the place of a labium, and is either cylindrical or conical, and articulated in the form of a *rostrum*, or fleshy or membranous, inarticulated, and terminated by two lips constituting a *proboscis*. The labrum is triangular and arched, and covers the base of the sucker.

In the second modification, the labrum and mandibles are nearly obliterated, or are extremely small: the labium is no longer free, and is only distinguishable by the presence of two palpi, to which it gives insertion: the jaws have acquired a most extraordinary length, and are transformed into tubular filaments, which, being united at their edges, compose a sort of spiral proboscis called the *tongue*, but which, to avoid all equivocation, it would be better to call *spirignatha;* its interior exhibits three canals, the intermediate of which is the duct of the alimentary juices. At the base of each of these filaments is a palpus, usually very small, and but slightly apparent.

The Myriapoda are the only insects in which the mouth presents another mode of organization—it will be explained in treating of that order.

The trunk(1) of insects, or that intermediate portion of their body which bears the legs, is generally designated by

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(1) This term, here, is synonymous with that of thorax. In order to avoid confusion, I think it would be better to restrict the application of the former to the Linnæan Aptera with more than six legs, and where those organs are borne by particular segments, that is, where the head is distinct from the trunk. With respect to the Crustacea in which these parts of the body are confounded, the thorax might be called thoracida; and cephalo-thorax in the Arachnides, animals presenting the same character, but in which the trunk or thorax is more simple and provided with fewer appendages. The Entomostraca, in this respect, approach the latter, but as they belong to another class, the term *thoracida* should still be applied to them; that of *thorax* would then be exclusively appropriated to the Hexapoda.

the term *thorax*, or *corselet* by the French. It is composed of three segments, not well distinguished at first, the relative proportions of which vary considerably. Sometimes, as in the Coleoptera, the anterior, much the largest, separated from the following one by an articulation, movable, and alone exposed, appears at the first glance to constitute the entire trunk, and is called the *thorax* or *corselet;* sometimes, as in the Hymenoptera, Lepidoptera, &c., it is much shorter than the ensuing one, has the appearance of a collar, and, with the two others, forms a common body, attached to the abdomen by a pedicle, or adhering closely to it across its whole posterior width, and is also called *thorax*. These distinctions were insufficient, and frequently ambiguous, inasmuch as they were not based on a ternary division, distinctly announced by me in the first edition of this work, as a character proper to the Hexapoda. M. Kirby having already employed the denomination of *metathorax,* to designate the after-thorax(1), that of *prothorax* and *mesothorax*, the ternary division once established, naturally presented itself to the mind, and the celebrated professor Nitzsch was the first to employ it. Some naturalists have since designated the prothorax or anterior segment, that which bears the two first feet, by the term collar, *collare*. Wishing to retain the denomination of *corselet*, but to restrain

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(1) This segment should not be restricted, in the Hymenoptera, to this superior, very short, and transverse division of the thorax, on the sides of which the second wings are inserted. It is also formed of that portion of the thorax which extends backwards to the origin of the abdomen, a circumstance which evidently demonstrates the position of the two last stigmata of the trunk, they being placed on the sides of this extremity, behind the wings, and above the last pair of legs. I am even of the opinion that this observation will apply to all winged Insects. Their metathorax should be divided, at least above, into two parts or semi-segments, one, in the Tetraptera, bearing the second wings and destitute of stigmata, and the other furnished with them; sometimes this latter portion, as in nearly all Insects, the Hymenoptera with a pediculated abdomen, the Rhipiptera and Diptera excepted, appears to belong to the abdomen; sometimes it is incorporated with the trunk or thorax and closes it posteriorly, as in those last mentioned. In the Orthoptera, Hymenoptera, Lepidoptera and Diptera, the two anterior or thoracic segments are placed between the prothorax and the mesothorax. The abdomen will then consist of nine complete segments, the three last of which compose the organs of generation.

its application within proper limits, we will employ that term in all those cases where this segment is much larger than the others, and where these latter are joined to the abdomen, and seem to constitute an integral part of it—a disposition proper to the Coleoptera, Orthoptera, and several of the Hemiptera. When the prothorax is short, and forms with the succeeding segments a common and exposed mass, the trunk composed of the three will retain the name of thorax. We will also continue to style *pectus* the inferior surface of the trunk, dividing it according to the segments, into three areæ, the *ante-pectus*, *medio-pectus*, and *post-pectus*. The median line will also constitute the sternum, which we divide into three parts: the *ante-sternum*, *medio-sternum*, and *post-sternum*.

The teguments of the thoracic segments, as well as of those of the abdomen, are usually divided into two annuli or semi-annuli, the one dorsal or superior, the other inferior, laterally united by a soft and flexible membrane, which, however, is but a portion of the same tegument that in many Insects, the Coleoptera particularly, is less firm. At the point of junction between these annuli we observe a little space of a more solid texture, or of the consistence of the annulus itself, which bears a stigma, so that the sides of the abdomen present a longitudinal series of small pieces, or each segment seems to be quadripartite. Other equally corneous pieces occupy the inferior sides of the mesothorax and metathorax and immediately under the origin of the elytra and wings, which are supported by another longitudinal piece. The relations of these parts, the size and form of the first joint of the coxæ, the manner in which they are articulated with the semi-annulus to which they belong, the extent and direction of that semi-annulus varying, furnish the thorax, thus considered, with a combination of characters, which in a systematic point of view are of great importance. Some naturalists, Knoch in particular, had already employed them, but on no fixed principle, and under arbitrary denominations. A necessary preliminary step was the careful and comparative study of the thorax, as it exists in all the orders of the class of Insects. This was undertaken at my request, by the late Lachat. His friend, M. Victor Audouin, has prosecuted his researches and presented to the Academie des Sciences an excellent memoir on the subject. All that is yet known of it however is from the general sketch given by the Baron Cuvier in his report(1) and by the extract published by the author in the article INSECTES of the Dict. Class. d'Histoire Naturelle. Before we can adopt his nomenclature, and apply it generally, we must wait until his work and the figures which accompany it are published; for all practical purposes, however, the denominations already introduced may suffice. A second production relative to the same subject, which both justice and friendship here compel me to notice, is that of M. Chabrier on the flight of Insects. It forms part of the Mem. du Mus. d'Hist. Nat., but is sold separately. The figures are executed on a great scale, as are also those of a Memoir of Jurine, Sen. on the wings of the Hymenoptera, a work, like the preceding one, which is the result of infinite patience.

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(1) The exposition of the parts of the thorax, and a fixed nomenclature created for them, says the Baron in his report, should naturally be placed at the head of the work. The trunk of Insects is always divisible into three annuli, each of which bears a pair of legs, called by M. Audouin, from their position, the *prothorax*, the *mesothorax*, and the *metathorax*. Besides these legs, the mesothorax bears the first pair of wings, and the metathorax the second. Each of these three segments is composed of four parts: one inferior, two lateral (forming the pectus), and a fourth superior, which constitutes the back; the inferior is called the *sternum;* the lateral portion, or the *flank*, is divided into three principal parts, one which is attached to the sternum, called *episternum*, another behind the first, and to which the coxa is articulated, the *epimera* (épimére). A little movable piece, hitherto unknown, which serves to unite the epimera and the coxa, is named *trochantinus*, (trochantin) by way of distinguishing it from trochanter. The third piece of the flank, which in the mesothorax and metathorax is situated before the episternum and under the wing, is called the *hypothera*. Sometimes there is also a small corneous piece round the stigma, styled the *peritrema*. The superior portion of each segment, which the author calls *tergum*, is divided into four pieces, named, from their position in each ring, *præscutum*, *scutum*, and *postscutellum*. The first is frequently, and the fourth almost always, concealed in the interior. Naturalists have seldom distinguished any other part of the mesothorax but the *scutellum*, which is frequently remarkable for its large size and its configuration, although an analogous piece is found in the three segments. Thus the trunk of Insects may be divided into thirty-three principal parts, and, if we count the hypothera, the number will amount to forty-three, more or less visible in the interior. From these pieces, besides, arise various internal productions, which, on account of their uses and importance, require to be named: thus, from the posterior portion of the sternum of each segment, a vertical apophysis arises internally, sometimes shaped like a Y, called by M. Audouin the *entothorax*. It furnishes insertions to muscles and protects the medullary cord; an analogous one is seen in the head and sometimes in the first annuli of the abdomen. Other internal prominences result from the prolongation of the external neighbouring pieces that are soldered together. M. Audouin names them *apodema* (apodémes). Some of them give insertion to muscles, others to the wings:—finally, there are other small movable pieces either internally and between the muscles, or at the base of the wings, which our author styles the (épidémes) *epidema*. We have stated that the principal pieces, or vestiges of them, are always to be found, but they are frequently far from being separable. In particular genera, or in certain orders, many are only to be distinguished by traces of sutures. M. Audouin—Dict. Class. d'Hist. Nat., art. *Insectes*—has since substituted the name of *paraptera* for that of hypoptera. That of entothorax will also be changed, in some situations, into *entocephala*, relative to the head—and into *entogaster*, as respects the abdomen. He remarks that the head of Insects is composed of several segments. We have also observed, that the rostrum of the Cicadæ, repre-

As Insects inhabit all kinds of dwellings, they are provided with all sorts of locomotive organs, *wings* and *feet*, which in several, act as fins.

The wings are membranous, dry, elastic organs, usually diaphanous, and attached to the sides of the back of the thorax: the first, when there are four, or when they are unique, on those of its second segment, and the second on those of the following or of the metathorax. They are composed of two membranes laid one on the other, and are traversed in various directions by more or less numerous nervures, which are so many tracheal tubes, now forming a network, and then simple veins. A celebrated naturalist, Jurine, Sen., has taken advantage of the disposition and decussation of these nervures(1) in a systematic point of view. The Libellulæ, Apes, Vespæ, Papiliones, &c., have four wings; but those of the latter are

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senting the lower lip, is not attached to the head, but to the membrane which unites it with the thorax, and thus also we find that the two medullary cords form two contiguous ganglions under the mouth. In accordance with these views, we consider the first segment of the body of the Scolopendræ, that which bears the two hooks, as an analogous division of the head. It seems that Knoch had distinguished the epimera by the names of *scapulæ* and *parapleuræ*; the post-pectus by that of *acetabulum*, while the mediopectus was his *peristæthium*. The first joint of the four posterior coxæ, in most of the Coleoptera, forms a transverse plate enclosed in the flanks, and is the piece, as far as I can judge, that he calls the *mærium*.

(1) See general observations on the Hymenoptera.

covered with small scales, which at the first glance resemble dust, and give them the magnificent colours in which they are drest. They are easily removed with the finger, and that portion of the wing becomes transparent. By the aid of glasses we discover that these scales are of various figures, and implanted in the wing by means of a pedicle, arranged gradually and in series, like tiles on a roof. Before the superior wings of these Insects are two species of epaulettes—*pterygoda*—which extend posteriorly along a portion of the back on which they are laid. The wings of some Insects remain straight, or are doubled transversely. Those of others are folded or plaited longitudinally like a fan. Sometimes they are horizontal, and sometimes inclined in the manner of a roof; in several they cross on the back, and in others they are distant(1). Directly under them, in the Diptera, are two small movable threads with a claviform termination, which, according to the general opinion(2) seem to replace the two wings that are wanting. They are called (balanciers) *halteres*. Other two-winged and more extraordinary Insects have also two halteres, but situated at the anterior extremity of the thorax, which to distinguish from the others we will call *prohalteres*. Above these appendages is a little membranous scale formed of two pieces united by one of their edges and resembling a bivalve shell—it is the *alula* or *cueilleron*. The same appendage is also observed under the elytra (at their base) of some aquatic Coleoptera.

Many Insects, such as the Melolonthæ, Cantharides, &c., in lieu of the two superior or anterior wings, are furnished with two species of scales, more or less solid and opaque, which open and close, and beneath which, when at rest, the wings are transversely folded. These scales or wing cases are called *elytra*(1). The Insects provided with them are named *Coleoptera*, and in such they are never absent, though this is sometimes the case with respect to the wings. In other Insects the extremity of the scale is completely membranous, or like the wing: they are styled *Hemiptera*.

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(1) The Insect is supposed to be at rest. The rapid vibration of these organs appears to us to be one of the principal causes of the *humming* produced by these animals. The explanations hitherto given of it are not satisfactory.

(2) They are, in my opinion, appendages of the tracheæ of the first abdominal segment, and correspond to that space, perforated with a small hole, adjacent to the anterior side of an opening, with a membranous and internal diaphragm, that is seen on each side in the same segment in everal species of Acrydium. See my Mém. sur les Append. Artic. des Insect., in the Mém. du Mus. d'Hist. Nat.

The *scutel* or *scutellum* is usually a small triangular piece, situated on the back of the mesothorax, and between the insertions of the elytra or of the wings. Sometimes it is very large, and then it covers the greater part of the superior portion of the abdomen. In various Hymenoptera, behind the scutellum and on the metathorax, we find a little space called the *post-scutellum*.

The ambulatory organs of locomotion consist of a *coxa* formed of two pieces, a *femur*, an uniarticulated *tibia*, and of a *tarsus*, which is divided into several phalanges. The number of its articulations varies from three to five, a difference which greatly depends upon the proportional changes experienced by the first and penultimate joints. Although their supputation may sometimes prove embarrassing, and this numerical series may not always be in exact accordance with the natural order, it furnishes a good character for the distinction of genera. The last joint is usually terminated by two hooks. The form of the tarsi is subject to some modifications, according to the habits of the animal. Those of aquatic species are usually strongly ciliated and flattened, and resemble oars(2).

The abdomen, which forms the third and last part of the body, is confounded in the Myriapoda, with the thorax: but in all other Insects, or those which have but six feet, it is distinct. It contains the viscera and the sexual organs, presenting nine or ten segments or annuli, some of which, however, are frequently concealed or considerably reduced. The organs of generation are situated at the posterior extremity and issue through the anus. The Iuli and Libellulæ alone constitute exceptions. The last annuli of the abdomen, in several females, form a retractile or always projecting ovipositor—*oviscapte* of Marcel de Serres—more or less complicated, which act as an auger. A sting is substituted for it in many of the female Hymenoptera. The fecundating organ of the male is almost always provided with hooks or a forceps(1). The sexes usually copulate but once, and this junction in certain genera is even sufficient for the fecundation of several successive generations. The male places himself on the back of his mate, and remains there for some time. The latter soon lays her eggs(2), and deposits them in the way best adapted for their preservation, and in such a manner that the moment the larvæ make their appearance, suitable aliment is always within their reach. Frequently she collects provisions for them. This maternal solicitude often excites our surprise, and more particularly unveils the instinct of Insects. In the numerous societies of several of these animals, such as the Ant, Termes, Wasp, Bee, &c., those individuals which form the greater portion of the community, and by whose labour and vigilance the whole community are maintained, have been considered as being of neither sex. They have also been designated by the terms of *labourers* and *mules*. It is now known, however, that they are females, whose sexual organs or ovaries have not been fully developed, and that if an amelioration of their diet perfect those organs at a particular epoch while they are young, they become fruitful.

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(1) For their chemical composition, see Odier, Mem. cit., in the Mem. de la Soc. d'Hist. Nat.; and the article *Insectes* of the same work.

(2) M. Kirby, in his Monograph of the Bees of England, designates the two anterior tarsi by the name of *hands*. The first joint is the *palm,—palma*. This gentleman, in conjunction with M. Spence, has published a very complete and detailed work on the elements of Entomology.

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(1) The generating organs of the male consist of an apparatus for the elaboration of the semen, and of the parts proper to copulation. The preparatory apparatus is composed of testes, vasa deferentia, and vesiculæ seminales. The copulating instrument is a penis provided with an armature consisting of surrounding parts, of various forms, acting like pincers or forceps, with which the male seizes the posterior extremity of the body of the female. The sexual apparatus of the latter is composed of an ovary, the receptacle or calyx formed by its base and the oviduct. For more minute details, see the memoirs of M. Dufour, Ann. des Sc. Nat., and the Dissertation of Hegetschweiler, Zurich, 1820.

(2) M. Audouin supposes, that in a great number of Insects, the ova are fecundated, as they descend, in a sac situated near the anus; but this idea requires to be confirmed by experiment, and one of those naturalists who have most closely studied the anatomy of these animals, M. Dufour, is of a different opinion.

The ova are sometimes hatched in the abdomen of the mother; she is then *viviparous*. The number of generations in a year depends on the duration of each of them. Most commonly there is but one or two. A species, all things being equal, is so much the more common, as one generation succeeds more rapidly to another, and as the female is more prolific.

A female Papilio or Butterfly, post coitum, lays her eggs, from which are hatched, not Butterflies, but animals with an elongated body, divided into rings, and a head furnished with jaws and several small eyes, having very short feet, six of which are anterior, scaly, and pointed, the rest varying in number and membranous, being attached to the posterior annuli. These animals, called *caterpillars*, live in this state for a certain period, and repeatedly change their skin. An epoch, however, arrives, when from this skin of a caterpillar issues a totally different being, of an oblong form and without distinct limbs, which soon ceases to move and remains a long time apparently desiccated and dead under the name of a *chrysalis*. By close examination we may discover on the external surface of this chrysalis, lineaments which represent all the parts of the Butterfly, but under proportions differing from those they are one day to possess. After a longer or shorter period, the skin of the *chrysalis* splits, and the Butterfly, humid and soft, with flabby short wings, issues from it—a few moments, however, and it is dry, the wings enlarge and become firm, and the perfect animal is ready for flight. It has six long legs, antennæ, a spiral proboscis, and compound eyes—in a word, it has no resemblance whatever to the caterpillar, from which it has originated, for it is ascertained that these various changes are nothing more than the successive development of parts contained one within the other.

This is what is styled the *metamorphosis* of Insects. In their first condition they are called *larvæ*, in their second *pupæ* or *nymphs*, and in the third *perfect insects.* It is only in the last state that they are capable of reproduction.

All Insects do not pass through these three states. Those which are apterous issue from the ovum with the form they are always to preserve(1): they are said to be *without a metamorphosis.* Of those that have wings, many experience no other change than that of receiving them: these are said to undergo a *demi-metamorphosis.* Their larva resembles the perfect insect, with the single exception of the wings, which are totally wanting. The *nymph* only differs from the larva in possessing stumps or rudiments of wings, which are developed at its final change of tegument, and render the animal perfect. Such are the Cymeces, Grylli, &c. Finally, the remaining Insects provided with wings that are said to undergo a *complete metamorphosis,* are at first *larvæ,* resembling caterpillars or Worms, and then become motionless *nymphs,* but presenting in that state all the parts of the perfect insect contracted, and as if wrapped in a bandage.

In the nymph of the Coleoptera, Neuroptera, Hymenoptera, &c., these parts, though closely approximated and in contact with the body, are free; but they are not so in that of the Lepidoptera and of many Diptera. An elastic or solid skin is moulded over the body and its external parts, forming a kind of case for it.

That of the chrysalides of the Lepidoptera merely consisting of a simple pellicle applied to the external organs, following their contour in every direction, and forming, for each of them, so many moulds, like the envelope of a mummy, allows us to recognize and distinguish them(2); but those of Flies and Syrphi, formed of the dried skin of the larva, resemble an egg-like shell. It is a species of capsule or case in which the animal is shut up(3).

Many larvæ, before they pass into their pupa state, prepare a cocoon in which they enclose themselves, either with silk which they draw from the interior of their bodies by means of the spinning apparatus of their lip, or other materials which they collect. The perfect Insect issues from the nymph through a fissure or slit which opens on the back of the thorax. In the pupæ of Flies one of the extremities is detached, like a cap, to allow the egress of the animal.

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(1) The *Pulex,* the female *Mutillæ,* the *Working Ants,* and some few other Insects excepted.

(2) *Pupa obtecta,* L.

(3) *Pupa coarctata,* L.

The larvæ and pupæ of those Insects which experience a demi-metamorphosis only differ from the same in a perfect state, in the absence of wings. The other external organs are precisely alike. But in such as undergo a complete metamorphosis, the form of the body of the larva has no constant relation with that it is to possess in its perfect state. It is usually more elongated; the head is frequently very different, as well in its consistence as in its figure, having mere rudiments of antennæ or perhaps none at all; there are never any compound eyes.

There is also a great disparity in the organs of manducation, as may be easily seen by comparing the mouth of a caterpillar with that of the Butterfly, or the mouth of the larva of a Fly with that of the perfect Insect.

Several of these larvæ are destitute of feet; others, such as the caterpillars, have many, all, the six first excepted, membranous, and without terminal hooks. Some Insects, such as the Ephemeræ, exhibit a singular anomaly in their metamorphosis—the animal arrived at its perfect state undergoes another change of tegument(1).

The Insects which constitute our three first orders preserve for life their natal form. The Myriapoda, however, exhibit a kind of metamorphosis. At first they have but six legs, or, according to Savi, are altogether destitute of them;

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(1) "Se dépouillent encore de leurs ailes," is the unguarded expression of our author. It is not the wings alone, but the entire animal, after attaining its perfect condition, that is thus divested of its external pellicle, even to the slender, setaceous appendages which terminate the posterior extremity of the body. It is the common May-fly of our country. *Am. Ed.*

the others, as well as the segments on which they depend, are developed by age.

But few vegetable substances are protected from the voracity of Insects; and as those which are necessary or useful to Man are not spared by them more than others, they become very injurious, particularly during seasons which favour their multiplication. Their destruction greatly depends upon our vigilance and knowledge of their habits. Some of them are omnivorous—such are the Termites, Ants, &c., whose ravages are but too well known. Several of those which are carnivorous, and all the species which feed on dead animal and excrementitious matters, are a benefit conferred on us by the Author of Nature, and somewhat compensate for the inconvenience and injury we experience from the others. Some are employed in medicine, the arts, and our domestic economy.

They have numerous enemies: Fishes destroy many of the aquatic species; Birds, Bats, Lizards, &c., deliver us from a part of those which inhabit the air or earth. Most of them endeavour to escape by flight or running from the dangers that surround them, but some have recourse to stratagem or arms.

Having undergone their ultimate transformation, and being possessed of all their faculties, they hasten to propagate their species:—this aim once accomplished, they soon cease to exist. Thus, each of the three finer seasons of the year produces species peculiar to it. The females and males of those which live in societies, however, enjoy a longer term of life. Individuals hatched in autumn shelter themselves from the rigours of winter, and reappear in spring.

The species, like those of plants, are circumscribed within geographical limits. Those of the western continent for instance, a very few, and all from the north, excepted, are strictly peculiar to it; such also is the case with several genera. The eastern continent, in turn, possesses others which are unknown in the western. The Insects of the south of Europe and north of Africa, and of the western and southern countries of Asia, have a strong mutual resemblance. The same may be said of those which inhabit the Moluccas, and more eastern islands, those of the Southern Ocean included. Several northern species are found in the mountains of southern countries. Those of Africa differ greatly from the opposite portions of America. The Insects of Southern Asia, from the Indies on the Sind eastward, to the confines of China, are very much alike. The intertropical regions, covered with immense and well watered forests, are the richest in Insects of any on the globe; Brazil and Guiana are particularly so.

All general systems or methods relative to Insects are reduced essentially to three. Swammerdam based his on their metamorphoses; that of Linnæus was founded on the presence or absence of wings, their number, consistence, superposition, the nature of their surface, and on the deficiency or presence of a sting. Fabricius had recourse to the parts of the mouth alone. In all these arrangements the Crustacea and Arachnides are placed among the Insects, and in that of Linnæus, the one generally adopted, they are even the last. Brisson, however, had separated them, and his class of the Crustacea which he places before that of Insects, comprises all of those animals which have more than six feet, or the *Insectes Apiropodes* of M. Savigny. Although this order is more natural than that of Linnæus, it was not followed; and it is only in modern times, that anatomical observations and their rigorously exact application have brought us to the natural method(1).

I divide this class into twelve orders: the three first of which; composed of apterous Insects, undergoing no essential change of form or habits, merely subject to simple changes of tegument, or to a kind of a metamorphosis, which increases the number of legs, and that of the annuli of the body; correspond to the order of the *Arachnides antennistes* of Lamarck. The organ of sight in these animals is usually a mere (more or less considerable) assemblage of simple eyes resembling granules. The following orders compose the class of *Insectes* of the same author. That of the Suctoria, which only comprises the genus Pulex, from its natural relations should apparently terminate the class, but as I place those Insects which are apterous at the beginning, this order, for the sake of regularity in the system, should immediately follow that of the Parasita.

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(1) Cuv., Tabl. Elém. de l'Hist. Nat. des Anim., and Leçons d'Anat. Compar.; Lamarck, Syst. des Anim. sans Verteb.; Latr., Précis des Caract. Génér. des Insect., and Gen. Crust. et Insect. For more minute details, see also the excellent elementary work of Kirby and Spence.

Certain English naturalists have formed new orders, based upon the wings; I see no necessity, however, for admitting them, that of the *Stresiptera* excepted, the name of which appears to me to be erroneous(1), and which I will call *Rhipiptera*(2).

In the first order or the MYRIAPODA, there are more than six feet—twenty-four and upwards—arranged along the whole length of the body, on a suite of annuli, each of which bears one or two pairs, and of which the first, and in several even the second, seem to form a part of the mouth. They are apterous(3).

In the second or the THYSANOURA, there are six legs, and the abdomen is furnished on its sides with movable parts, in the form of false feet, or terminated by appendages fitted for leaping.

In the third or the PARASITA, we find six legs, no wings, and no other organs of sight than ocelli; the mouth, in a great measure, is internal, and consists of a snout containing a retractile sucker, or in a slit between two lips, with two hooked mandibles.

In the fourth or the SUCTORIA, there are six legs, but no wings(4); the mouth is composed of a sucker inclosed in a cylindrical sheath, formed of two articulated portions.

In the fifth or the COLEOPTERA, there are six legs, and four wings, the two superior of which have the form of cases, and mandibles and maxillæ(1) for mastication: the inferior wings are simply folded crosswise, and the cases, always horizontal, are crustaceous. They experience a complete metamorphosis.

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(1) Twisted wings. The parts taken for elytra are not so. See this order.

(2) Wings folded like a fan.

(3) Destitute of wings and scutellum.

(4) They undergo metamorphoses and acquire organs of locomotion which they did not possess at first. This character is common to the following orders, but in the latter the metamorphosis developes another sort of locomotive organs—the wings.

In the sixth or the ORTHOPTERA(2), there are six legs; four wings, the two superior in the form of cases, and mandibles and jaws for mastication, covered at the extremity by a *galea;* the inferior wings are folded in two directions, or simply in their length, and the inner margins of the cases, usually coriaceous, are crossed. They only experience a semi-metamorphosis.

In the seventh or the HEMIPTERA, there are six legs and four wings, the two superior in the form of crustaceous cases, with membranous extremities, or similar to the inferior, but larger and firmer; the mandibles and jaws are replaced by setæ forming a sucker, enclosed in a sheath composed of one articulated, cylindrical or conical piece, in the form of a rostrum.

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(1) The maxillæ of coleopterous Insects, in conjunction with the mandibles, usually have this triturating function assigned to them. M. Hentz, a distinguished American entomologist, Trans. Phil. Soc., III, part ii, p. 458, is of the opinion that in many cases the maxillæ must be considered as mere appendages to the tongue, and that their office is to assist in deglutition, seldom serving to grind or lacerate, except in the *Melolonthidæ, Rutelidæ,* and some others, where there seems to be a departure from their primary use. In corroboration of this idea he adduces the configuration of the maxillæ of several Insects, in which he has been fortunate enough to detect a retractile appendage hitherto unknown. The first is the *Cantharis marginata,* Fab., whose maxillæ, when dried, offer but one bifid lobe; if, however, the abdomen and thorax of the recent animal be gradually compressed, a soft, elastic, sub-conic body is protruded from the cleft of that lobe, more than half its length, and extending beyond the palpi; a second appendage of the same kind, and about half its length, projects at right angles from the base of the first, which is directed forwards: both are covered with hairs. The second is the *Canth. bimaculata,* Fab., in which this appendage is still more sensibly and easily displayed, protruding by pressure from each maxilla in the form of a tapering filament covered with fine hairs, susceptible of considerable extension, reaching beyond the middle of the antennæ, and consequently more than double the length of the maxilla itself. I have verified these facts in this last species. The use of these organs in collecting nourishment from flowers is evident. See Trans. Phil. Soc. ut sup. pl. XV, f. i, e, and f. ii, e. *Am. Ed.*

(2) De Geer established this order under the name of *Dermaptera,* improperly changed by Olivier to that of *Orthoptera.* We preserve the latter, however, as naturalists have generally adopted it.

In the eighth or the NEUROPTERA, there are six legs, four membranous and naked wings, and mandibles and jaws for mastication; the wings are finely reticulated, and the inferior are usually as large as the superior, or more extended in one of their diameters.

In the ninth or the HYMENOPTERA, there are six feet, and four membranous and naked wings, and mandibles and jaws for mastication; the inferior wings are smaller than the others, and the abdomen of the female is almost always terminated by a terebra or sting.

In the tenth or the LEPIDOPTERA, there are six legs, four membranous wings, covered with small coloured scales resembling dust; a horny production in the form of an epaulette, and directed backwards, is inserted before each upper wing, and the jaws are replaced by two united tubular filaments, forming a kind of spirally convoluted tongue(1).

In the eleventh or the RHIPIPTERA, there are six legs, two membranous wings folded like a fan, and two crustaceous movable bodies, resembling little elytra(2), situated at the anterior extremity of the thorax; the organs of manducation are simple, setaceous jaws, with two palpi.

In the twelfth or the DIPTERA, there are six legs, two membranous extended wings, accompanied, in most of them, by two movable bodies or halteres, placed behind them; the organs of manducation are a sucker composed of a variable number of setæ, inclosed in an inarticulated sheath, most frequently in the form of a proboscis terminated by two lips.

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(1) *Spiritrompe*. See our general observations on the class. The thorax of the Lepidoptera has more analogy with that of the Neuroptera, than with that of the Hymenoptera, the segment which I have called the mediate appearing to form part of the abdomen, while in the latter and in the Diptera it is incorporated with the thorax.

(2) Formed, as we presume, by pieces analogous to the epaulette or *pterygoda* of the Lepidoptera.

ORDER I.

MYRIAPODA(1).

The Myriapoda commonly called Centipedes, are the only animals of this class which have more than six feet in their perfect state, and whose abdomen is not distinct from the trunk. Their body, destitute of wings, is composed of a (usually) numerous suite of annuli, most commonly equal, each of which, a few of the first excepted, bears two pairs of feet mostly terminated by a single hook; these annuli are either entire or divided into two demi-segments, each bearing a pair of those organs, and one of them only exhibiting two stigmata(2).

The Myriapoda in general resemble little Serpents or Nereides, their feet being closely approximated to each other throughout the whole extent of the body. The form of these organs even extends to the parts of the mouth. The mandibles are bi-articulated and immediately followed by a quadrifid piece in the form of a lip with articulated divisions, resembling little feet, which, from its position, corresponds to the ligula of the Crustacea; next come two pairs of little feet, the second of which, in several, resemble large hooks, that appear to replace the four jaws of the last mentioned animals, or the two jaws as well as the lower lip of Insects: they are a sort of buccal feet. The antennæ, two in number, are short, somewhat thicker towards the extremity, or nearly filiform and composed of seven joints in some; in others they are numerous and setaceous. Their visual organs are usually composed of a union of ocelli, and if in others they present a cornea

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(1) The *Mitosata*, Fab.

(2) The annuli of the body of Insects are usually provided with two stigmata. If those of the Scolopendræ, particularly the larger species, those which have twenty-one pairs of feet, be thus considered, it will be found that they are alternately destitute of, and provided with, two stigmata, and that thus, compared with these latter animals, they are in fact but semi-annuli. Each complete segment will then have two pairs of feet, one of which is supernumerary, since, in other Insects, the annuli furnished with feet have but two.

with facets, the lenses are still larger, rounder, and more distinct, in proportion, than those of the eyes of Insects. The stigmata are frequently very small, and their number owing to that of the annuli, is usually greater than in the latter where it never exceeds eighteen or twenty. The number of these annuli and that of the feet increases with age, a character which also distinguishes the Myriapoda from Insects, the latter ab ovo always having the number of segments peculiar to them, and all their legs with hooks, or true legs, being developed at once, either at the same epoch or when they pass into their pupa state. M. Savi, professor of mineralogy at Pisa, who has paid particular attention to the Iuli, has observed, that on leaving the egg they are destitute of these organs: they experience then a true metamorphosis. In some, the male organs of generation are placed immediately after the seventh pair of feet, on the sixth or seventh segment of the body, and those of the female near the origin of the second feet: in the others the two sorts of organs are situated, as usual, at the posterior extremity of the body. The position of the male organs of the first compared with that in which they are placed in the Crustacea and Arachnides, would seem to indicate the separation of the trunk and abdomen: with respect to those in which these organs are posterior, we observe that an inversion of the successive order of the stigmata takes place in an analogous portion of the body of certain species, which appears to announce a similar distinction.

The Myriapoda live and increase in size longer than other Insects, and, according to Savi, two years are required to render the genital organs of some (the Iuli) of them apparent.

From this ensemble of facts, we may conclude, that these animals approach the Crustacea and Arachnides on the one hand, and the Insects on the other; but that as respects the presence, form and direction of the brachese, they belong to the latter.

We divide them into two families, perfectly distinct both in their organization and habits, and forming two genera according to the system of Linnæus.

FAMILY I.

CHILOGNATHA(1).

The body generally crustaceous and frequently cylindrical; the antennæ somewhat thicker near the end or nearly equal, and composed of seven joints; two thick mandibles without palpi, very distinctly divided into two portions by a median articulation with imbricated teeth, implanted in a cavity of its superior extremity; a species of lip—ligula(2)—situated immediately above, that covers them, is crustaceous, plane, and divided on its exterior surface by longitudinal sutures and emarginations into four principal areæ, tuberculated on their superior margin, the two intermediate of which, narrower and shorter, are placed at the superior extremity of another area, serving as a common base: the feet very short, and always terminated by a single hook; four feet, situated immediately under the preceding part, of the form of the following ones, but more closely approximated at base, with the radical joint proportionably longer; most of the others attached in double pairs to a single annulus. The male organs of generation are situated immediately after the seventh pair of feet, and those of the female behind the second. The stigmata are placed alternately, outside of the origin of each pair of feet, and are very small.

The Chilognatha move very slowly, or slide along, as it were, and roll themselves spirally or into a ball. The first segment of the body, and in some the following one, is the largest, and has the form of a corselet or little shield. It is only at the fourth, in some, and at the fifth or sixth in others, that the duplication of the feet commences; the first two or

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(1) Chilognatha, Lat. or the genus Iulus, Lin.

(2) The lower lip composed of the two pairs of jaws of the Crustacea, according to Savigny.

four feet are even entirely free to their origin, where they merely adhere to their respective segments by a median or sternal line. The last two or three rings are without feet. A series of pores is observed on each side of the body, which were considered as stigmata, but, according to Savi, they are simply designed to afford a passage to an acid fluid of an extremely disagreeable odour, which appears to serve as a means of defence; the respiratory apertures, for whose discovery we are indebted to him, are situated on the sternal part of each segment, and communicate internally with a double series of pneumatic sacs strung together like a rosary, extending along the body, from which proceed tracheal branches that ramify over the other organs. According to an observation of Straus, the sacs or vesicular trachea are not, as usual, connected with each other by a principal trachea.

In the environs of Pisa, where M. Savi collected the preceding facts, the nuptial season of the common Iulus commences near the end of December, and terminates about the middle of May. The male organs of copulation, in this species, are situated under the sixth segment, but they do not appear in this form till the individual has attained the one-third of its full size; until this epoch, that place is occupied by a pair of feet (the fifteenth), which is always found there in the females; in the latter, the orifice of the sexual organs is between the first and second segment.. Some female Glomeres and Iuli, behind the origin of the second pair of feet, exhibit two convex mammillæ, which appear to characterize this sex; that of the males also consists of two mammillæ, but each of them is terminated by a scaly and twisted hook. These Insects, in coitu, erect the anterior extremities of their bodies, and place them in contact, face to face, twining round each other inferiorly. The body of the new-born animal is reniform, perfectly smooth, and destitute of appendages. Eighteen days after, it undergoes its first change, and then for the first time assumes the form of the adult, still, however, having but twenty-two segments; the total number of feet also amounts to twenty-six pairs. Savi appears to contradict the assertion of De Geer, who says that he only found three pairs and eight annuli in the young animal—but is it certain that this change of which Savi speaks is really the first, and should we not, on the contrary, rather presume that these young individuals do not suddenly pass from a state in which they exhibit no locomotive appendages to one where we find them possessed of twenty-six pairs, or in a word, that previous changes of tegument, which have escaped the notice of Savi, have taken place and successively developed this number of feet? Do not the observations of the Swedish Reaumur confirm these gradual transitions? Be this as it may, the first eighteen pairs of feet, according to Savi, alone serve for locomotion; at the second change we observe thirty-six pairs, and at the third, forty-three; the body then consists of thirty segments. Finally, in the adult state, the male has thirty nine, and the female sixty-four; two years afterwards they again experience a change, and then only do the genital organs make their appearance. From the moment of their birth, which occurs in March, until November, at which time M. Savi terminated his observations, these changes take place about once a month. In their exuviæ, we find even the lining membrane of the alimentary canal and tracheæ. The organs of the mouth were the only parts that Savi could not discover(1).

These Insects feed on dead and decomposed animal and vegetable matters; they deposit in the ground a large number of eggs. According to the system of Linnæus they form but one genus, that of

IULUS, Lin.

Which we divide as follows:

Some have a crustaceous body without terminal appendages, and antennæ enlarged near the end.

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(1) See Bullet. Génér. et Univers. of the Baron Férussac, Decemb., 1823. The observations of Savi, an extract of which is contained in this work, were published in a memoir, entitled "Osservazioni per servire alla storia di una specie di Julus communissima," Bologna, 1817. The same savant published another in 1819 on the *Julus fœtidissimus*.

Glomeris, Lat.

Resembling Onisci; oval, and rolling into a ball; the body convex above, and concave underneath, with a range of little scales analogous to the lateral divisions of the Trilobites along each of its inferior sides. It is composed, exclusive of the head, of but twelve segments, the first and narrowest of which forms a sort of semicircular transverse collar; the following and the last are the largest of all; the latter is arched and rounded at the end. There are thirty-four feet in the female, and thirty-two in the male, his sexual organs replacing the pair that is deficient. These animals are terrestrial, and live under stones in hilly places(1).

Iulus, Lin.

The body of the true Iuli is cylindrical and very long, and has no ridge or trenchant edge on the sides of the annuli; they roll themselves up spirally.

The larger species live on land, particularly in the woods and sandy places, and diffuse a very disagreeable odour. The smallest ones feed on fruit, or the roots and leaves of esculent vegetables. Others are found under the bark of trees, in moss, &c.

I. maximus, L.; Marcgr., Bras., p. 255. Peculiar to South America, and is seven inches long.

I. sabulosus, L.; Schæff. Elem. Entom., lxxiii; *I. fasciatus*, De Geer, Insect. VII, xxxvi, 9, 10; Leach, Zoöl. Miscell., cxxxiii. About sixteen lines in length, of a blackish-brown, with two reddish lines along the back; fifty-four segments; the penultimate terminated by a stout point with a horny and hairy extremity. Inhabits Europe.

I. terrestris, L.; Geoff., Insect. II, xxii, 5. A fourth smaller; bluish-cinereous, picked in with light yellowish; forty-two to forty-seven segments. Inhabits Europe with the sabulosus(2).

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(1) *Iulus ovalis*, L.; Gronov., Zooph., pl. XVII, 4, 5;—*Oniscus zonatus*, Panz. Fam. Insect. Germ., IX, xxiii; *Glomeris marginata*, Leach, Zool. Miscell., CXXXII;—*Oniscus pustulatus*, Fab.; Panz., Ib., XXII.

(2) See the two memoirs of Savi already quoted, and Leach, Zool. Miscell., III, for an account of these two species and some others that inhabit England. Add *Iulus indus*, L.; De Geer, VII, xliii, 7; Seb., Mus. II, xxiv, 4, 5;—Seb., Mus. I, lxxxi, 5;—Schræt., Abhandl., I, iii, 7. [Add of the American species the *I. impressus*, *punctatus*, *annulatus*, *lactarius*, *marginatus*, and *pusillus*. *Am. Ed.*]

POLYDESMUS, Lat.

The Polydesmi resemble the Iuli in the linear form of their body, and the spiral manner in which they roll up their body; but the segments are compressed on the inferior sides, and have a projecting ridge above. They are found on stones, and most commonly in wet places(1).

The species with apparent eyes form the genus *Craspedosoma* of Leach(2).

The others have a very soft, membranous body, terminated by pencils of little scales. Their antennæ are equal. Such is the

POLLYXENUS, Lat.,

Which as yet comprises but a single species, placed among the Scolopendræ—*Sc. lagura*, L.,—by Linnæus, Geoffroy and Fabricius.

> It is the *Iule à queue en pinceau* of De Geer, Insect., VII, xxxvi, 1, 2, 3; Zool. Miscel., cxxxv, B. Very small, oblong, with bunches of little scales on the sides, and a white pencil at the posterior extremity of the body. It has twelve pairs of feet placed on as many semi-annuli. Inhabits cracks in walls, and under pieces of bark(3).

FAMILY II.

CHILOPODA(4).

The antennæ of the Chilopoda are more slender towards the extremity, and consist of fourteen joints and upwards; their mouth is composed of two mandibles furnished with a little palpiform appendage, which seem to have been soldered in the middle, and terminate like the bowl of a spoon with dentated edges; of a quadrifid lip(1), of which the two lateral divisions are the largest, and transversely annulated, resembling the membranous feet of caterpillars; of two palpi or little feet, united at base and unguiculated at the extremity, and of a second lip(2) formed by a second pair of feet, dilated and united at base, and terminated by a stout movable hook, whose inferior extremity is perforated by a hole which affords an issue to a venomous fluid.

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(1) The Iuli *complanatus* (Zool. Miscell. CXXXV, A), *depressa*, *stigma*, *tridentatus*, Fab.; his Scolopendræ? *dorsalis* and *clypeata*. [Amer. species, *P. serratus*, *granulatus*, Say, and the *Iulus virginiensis*, Drury. *Am. Ed.*]

(2) The species, unknown before Leach, appear to be proper to England. See pl. cxxxiv of his Zoological Miscellany, vol. III.

(3) There is a second species, *P. fasciculatus*, Say, that inhabits the southern section of the United States. See Journ. Ac. Nat. Sc. of Phil. II, part I, p. 108. *Am. Ed.*

(4) CHILOPODA, Lat. or the genus *Scolopendra*, Lin. &c.

The body is depressed and membranous. Each of its rings is covered with a coriaceous or cartilaginous plate, and most generally bears but a single pair of feet(3); the last is usually thrown backwards, and elongated into a kind of tail. The organs of respiration are wholly or partly composed of tubular tracheæ.

These animals run very fast, are carnivorous, avoid the light, and conceal themselves under stones, logs, in the ground, &c. They are much dreaded by the inhabitants of hot climates, where they are very large, and where their venom is possibly more active. The *Scolopendra morsitans* is styled in the Antilles the *malfaisante*. Some of them exhibit phosphorescent properties.

The organs of generation are internal and placed at the posterior extremity of the body, as in most of the following Insects. The stigmata are lateral or dorsal, and more apparent than in the preceding family.

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(1) A part analogous to the lower lip of the Chilognatha, representing, in my opinion, the tongue of the Crustacea, but also capable of fulfilling the function of jaws; Savigny calls it the first auxiliary lip.

(2) The second auxiliary lip of the same naturalist. It is not annexed to the head, but to the anterior extremity of the first semi-segment. The two hooked feet, by the union and dilatation of their first joint, form a plate resembling a mentum and lip. The same segment bears the two first ordinary feet. In the Scolopendræ proper of Leach, the two first stigmata are situated under the third half-segment, the first not counted; the second and following one will compose the first complete ring, and then the two first stigmata are found, as in other Insects, placed on a space corresponding to the prothorax. This second auxiliary lip may thus represent the inferior lip of the *grinding* Hexapoda. But here the pharynx is placed before that lip, whereas in the Myriapoda it is situated before the first auxiliary lip. It is from these considerations and affinities, and from others furnished by the Entomostraca and Arachnides, that I consider the feet of the Hexapoda as analogous to the six foot-jaws of the Crustacea Decapoda.

(3) In this case they are but semi-annuli. See our general observations on the order.

The Chilopoda, which, in the system of Leach, form the order *Syngnatha*, from these last characters, the nature of the respiratory organs and the feet, may be thus divided:

Some have but fifteen pairs of feet(1), and their body viewed from above presents fewer segments than when seen from beneath.

Scutigera, Lam.—*Cermatia*, Illig.

The body covered with eight scutelliform plates, under each of which M. Marcel de Serres has observed two pneumatic sacs or vesicular tracheæ, which receive air and communicate with lateral and inferior tubular tracheæ. The under part of the body is divided into fifteen semi-annuli, each bearing a pair of feet, terminated by a very long slender multi-articulated tarsus; the last pairs are more elongated; the eyes large and compound.

Their antennæ are slender and tolerably long; the two palpi salient and furnished with small spines. The body is shorter than in the other genera of the same family, and the joints of their feet are proportionably longer.

The Scutigeræ, which by these characters form the passage from the preceding family to the present one, are extremely agile animals, and frequently part with some of their feet when seized.

The species found in France(2) conceals itself between the beams and rafters of houses.

Lithobius, Leach.

The stigmata lateral; body divided above and beneath into a similar number of segments, each bearing a pair of feet; the superior plates alternately longer and shorter, and overlapping each other close to the extremity.

L. forficatus; *Scolopendra forficata*, L.; Fab., De Geer; Geoff.,

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(1) Dr Leach makes two pairs more by including the palpi and the hook-like feet of the head.

(2) The *Scolopendre à vingt-huit pattes* of Geoffroy which appears to differ from the *S. coleoptrata*, Panz., Faun. Insect. Germ., L, xii, and from that of Linnæus;—*Iulus araneoides*, Pall., Spicil. Zool., IX, iv, 16;—*Scolopendra longicornis*, Fab, of Tranquebar. See also Leach, Zool. Miscell., *Cermatia livida*, CXXXVI, and Lin. Trans. XIV.

Hist. des Insect., II, xxii, 3; Panz., Faun. Insect. Germ., L., xiii; Leach, Zool. Miscel., cxxxvii(1).

The others have at least twenty-one pairs of feet, and the segments both above and underneath are equal in size and number.

SCOLOPENDRA, Lin.

Those which form the two feet that immediately follow the two hooks forming the exterior lip, present but twenty-one pairs, and whose antennæ have seventeen joints, constituting the genera *Scolopendra* and *Crytops* of Leach. There are eight distinct eyes, four on each side in the first, and that in which the largest species are found; in the second, they are null or but very slightly visible.

The most southern departments of France and other countries of the south of Europe, produce a species—*Scolopendra cingulata*, Lat.; *Sc. morsitans*, Vill., Entom., IV, xi, 17, 18—which is nearly as large as the common species of the Antilles, but has a more flattened body(2).

Those which form the genus Crytops, Leach, have rougher antennæ than the Scolopendræ, and their two posterior feet are more slender. Leach mentions two species found in the environs of London(3).

In such as form the genus *Geophilus*, Id., the number of feet is more than forty-two, and often considerably so. The antennæ consist of but fourteen joints, and their extremity is less tapered; the body is proportionably narrower and longer. The eyes are but slightly apparent. Some of the species are electrical(4).

ORDER II.

THYSANOURA.

This order consists of apterous Insects, supported by six feet, that experience no metamorphosis, and have, in addition, particular organs of motion either on the sides or the extremity of the abdomen.

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(1) *L. variegatus, lævilabrum*, Leach, Lin. Trans., XI. See also vol. III of his Zoological Miscellany.

(2) *Scolopendra morsitans*, L.; De Geer, Insect., VII, xliii, 1. For the other species, see Zool. Miscell., III; the *Scolopendra gigantea*, L., Brown, Jam., XLII, 4, and other large but imperfectly described species.

(3) *Crytops hortensis*, Zool. Miscell., CXXXIX, Id., Ib.; *Crytops Savignii*.

(4) *S. electrica*, L.; Frisch., Insect., XI, viii, I;—*S. occidentalis*, L.; List. Itin.,

FAMILY I.

LEPISMENÆ, Lat.

Setiform antennæ divided from their origin into very numerous and small joints; mouth furnished with very distinct and salient palpi; each side of the under part of the abdomen provided with a range of movable appendages, in the form of false feet; abdomen terminated by articulated setæ, three of which are the most remarkable; body always covered with small shining scales.

It comprises but one genus, the

LEPISMA, Lin.

The body of these animals is elongated and covered with small scales, frequently silvery and brilliant, from which circumstance the most common species has been compared to a little Fish. The antennæ are setaceous and usually very long. The mouth is composed of a labrum, of two almost membranous mandibles, of two bipartite jaws, with a palpus consisting of five or six joints, and of a quadri-emarginated lip bearing two quadri-articulated palpi. The thorax is formed of three pieces; the abdomen, which is somewhat narrowed at its posterior extremity, is furnished along each side of the venter with a range of small appendages, supported by a short joint, and terminating in silky points, the last of which are the longest; a sort of scaly compressed stylet, composed of two pieces, issues from the anus; then come the three articulated setæ, which are extended beyond the extremity of the body. The feet are short and frequently have very large strongly compressed coxæ resembling scales.

Several species conceal themselves in the cracks in the frame work of windows, under damp boards, in wardrobes, &c. Others retire under stones.

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vi;—*S. phosphorea*, L.—it fell from the clouds on the decks of a vessel one hundred miles from the continent. See Zool. Miscell., III. *Geophilus maritimus* CXL, 1, 2;—*G. longicornis*, tab. ead., 3—6, and some other species.

These Insects run with great velocity; some of them by means of their caudal appendages are enabled to leap. They are divided into two subgenera.

MACHILIS, Lat.—*Petrobius*, Leach.

Eyes very compound, almost contiguous, and occupying the greater part of the head; body convex and arcuated above; abdomen terminated by small threads for saltation, of which the middle one, placed above the two others, is much the longest.

The maxillary palpi are very large, and have the form of small feet. The thorax is strangulated, the first segment smaller than the second and arched.

These Insects leap well and frequent stony and enclosed places. All the species known belong to Europe(1).

LEPISMA, Lin.—*Forbicina*, Geoff., Leach.

Eyes very small, widely separated, and composed of a small number of granules; body flattened, and terminated by three threads of equal length, inserted on the same line, and of no use in leaping.

Their coxæ are very large. Most of the species inhabit the interior of houses.

L. saccharina; *Forbicine plate*, Geoff., Insect., II, xx, 3; Schæff., Elem. Entom., lxxv. Four lines in length; of a silvery and somewhat leaden hue and immaculate; originally, it is said, from America, now very common in houses in Europe.

L. vittata, Fab. Body cinereous, dotted with blackish; four streaks of the same colour along the back of the abdomen. Other species are found under stones.

FAMILY II.

PODURELLÆ, Lat.

Antennæ quadriarticulated; no distinct or salient palpi; abdomen terminated by a forked tail folded under the venter when at rest, and used for leaping. The Podurellæ form but one genus in the Linnæan system.

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(1) *Lepisma polypoda*, L.; *L. saccharina*, Vill., Entom. Lin., IV, xi, I; Roem. Gener. Insect., XXIX, I; *Forbicine cylindrique*, Geoff.;—*Lepisma thezeana*, Fab.;—*Petrobius maritimus*, Leach, Zool. Miscell., CXLV.

PODURA, Lin.

These Insects are very small, soft and elongated, with an oval head and two eyes, each composed of eight granules. Their legs have but four distinct joints. The tail is soft, flexible, and formed of an inferior piece, movable at base, to the extremity of which are articulated two appendages susceptible of being approximated, separated, or crossed—they are the teeth of the fork. They have the faculty of elevating their tail, and then forcing it suddenly against the plane of position, as if they let go a spring, thus raising themselves into the air, and even leaping like the Pulices but to a less height. They usually fall on their back, with their tail extended posteriorly. The middle of the venter exhibits a raised oval portion divided by a slit.

Some keep on trees and plants, under old pieces of bark, or stones; others on the surface of stagnant waters, and sometimes on that of snow during a thaw. Several unite in numerous societies on the ground, and at a distance resemble little heaps of gunpowder. Some species appear to propagate in winter.

PODURA, Lat.

Antennæ equal, and without annuli or little joints to the last segment; body nearly linear or cylindrical; trunk distinctly articulated; abdomen narrow and oblong(1).

SMYNTHURUS, Lat.

Antennæ slenderer near the extremity, and terminated by an annulated piece, or composed of little joints; trunk and abdomen united in a globular or oval mass(2).

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(1) *Podura arborea*, L.; De Geer, Insect. VII, ii, 1—7;—*P. nivalis*, L.; De Geer, Ib., 8—10;—*P. aquatica*, L.; De Geer, Ib., ii, 17;—*P. plumbea*, L.; De Geer, Ib., iii, 1—4;—*P. ambulans*, L.; De Geer, Ib., 5—6;—*P. aquatica grisea*, De Geer, Ib., ii, 18, 21.

The *Pod. vaga*, *villosa*, *cincta*, *annulata*, *pusilla*, *lignorum*, *fimetaria*, Fab.

(2) *Podura atra*, L.; De Geer, Ib., iii, 7—14; the *Pod. viridis*, *polypoda*, *minuta*, and *signata*, Fab.

ORDER III.

PARASITA(1).

The Parasita, so called from their parasitical habits, have but six legs, and are apterous, like the Thysanoura; but their abdomen is destitute of articulated and movable appendages. Their organs of vision consist of but four or two simple eyes; a great portion of their mouth is internal, exhibiting externally either a snout or projecting mammilla containing a retractile sucker, or two membranous and approximated lips with two hooked mandibles. According to Linnæus, they form but one genus, that of

PEDICULUS, Lin.

Their body is flattened, nearly diaphanous, and divided into twelve or eleven distinct segments, three of which belong to the trunk, each bearing one pair of legs. The first of these segments frequently forms a sort of thorax. The stigmata are very distinct. The antennæ are short, equal, composed of five joints, and frequently inserted in a notch. There are one or two small ocelli on each side of the head. The legs are short, and terminated by a very stout nail, or two opposing hooks, which enable these animals to cling with great facility to the hairs of Quadrupeds, or to the feathers of Birds, whose blood they suck, and on whose bodies they propagate and pass their lives. They attach their ova to these cutaneous appendages. They multiply excessively, and one generation succeeds to another with great rapidity. Particular and unknown causes facilitate their increase to an astonishing degree in the *P. humanus*, producing in Man what has been termed the *morbus pediculosus*, and even in children. These Insects always live on the same Quadrupeds and on the same Birds, or at least on animals of these classes, which have analogous characters and habits. Two species frequently live on the same Bird. Their gait in general is very slow.

Some of them—*Pediculea*, Leach—such as the

PEDICULUS, Deg.,

Or true Lice, have a mouth consisting of a very small tubular mammilla situated at the anterior extremity of the head, in the form of a snout, containing a sucker when at rest. Their tarsi are composed of a joint almost equal in size to the tibia, terminated by a very stout nail, folding over a projection and with this point fulfilling the functions of a forceps. Those which I have examined presented but two simple eyes, one on each side.

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(1) *Parasita*, Lat.—*Anoplura*, Leach.

Three species live on Man; their ova are termed *nits.*

In the two following species, the thorax is very distinct from the abdomen, is about the same width and of a moderate length. They constitute the genus *Pediculus* properly so called of Leach(1).

P. humanus corporis, De Geer, Insect., VII, 1, 7. Dirty white; immaculate; emarginations of the abdomen less salient than in the following species. It is exclusively confined to the body of Man, and increases to a frightful extent in the morbus pediculosus.

P. humanus capitis, De Geer, Insect., VII, 1, 6. Cinereous; the spaces in which the stigmata are placed, brown or blackish; lobes of the abdomen rounded. On the head of Man, and of children particularly.

The males of this and the preceding species, at the posterior extremity of the abdomen, have a small scaly and conical appendage, resembling a sting, which is probably the organ of generation.

Hottentots, Negroes and various Monkeys eat these Pediculi, or are Phthiropagi. Oviedo pretends that these animals abandon the Spanish mariners on their way to India as soon as they have reached the tropics, but that on their return, when they arrive at the same point they find them in possession of their old quarters. It is also said that in India, however filthy be the individual, they are never found except on the head.

At one period the P. humanus was employed by physicians for the removal of ischuria—they introduced it into the urethra.

Dr Leach forms a particular genus, *Phthirus*, of the *P. pubis*, L.; Red., Exp., XIX, 1, which has a wide rounded body, a very short thorax almost confounded with the abdomen, and the four posterior feet very stout(2). It is commonly called Morpion. It attaches itself to the hairs of the genital organs and eye-brows. Its bite is very severe.

Redi has rudely figured several other species found on different

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(1) Zool. Miscell., III.

(2) For those species which live on Man, see the splendid work of Alibert on the diseases of the skin.

Quadrupeds. That which lives on the Hog has a very narrow thorax with a very wide abdomen, and forms the genus *Hæmatopinus*, Leach(1), the *Pou du Buffle*, figured by De Geer, Insect., VII, 1, 12, presents more important characters.

The others—*Nirmidia*, Leach—such as the

Ricinus, De Geer—*Nirmus*, Herm. Leach,

Have the mouth inferior, and composed externally of two lips and two mandibles, resembling hooks. Their tarsi are very distinct, articulated, and terminated by two equal hooks.

One single species excepted, that of the Dog, they are all exclusively confined to Birds. Their head is usually large, sometimes triangular, and at others forming a semi-circle or crescent, and frequently presenting angular projections. It sometimes differs, like the antennæ, in the two sexes. I have perceived, in several, two simple approximated eyes on each side of the head. According to the observations of M. Savigny, communicated to me by himself, these animals are provided with jaws, each of which has a very small palpus, hidden by the lower lip, which has also two organs of the same description. They have moreover a kind of tongue.

M. Leclerc de Laval informs me that he has found parcels of feathers in their stomach—he thinks that they constitute their only food. De Geer, however, assures us that he has found the Pediculus of the Fringilla cœlebs filled with recently imbibed blood. It is well known that these Insects survive but a short time on dead Birds. When thus situated, they are observed to wander over their plumes with much anxiety, those of the head and the vicinity of the beak especially.

Redi has also represented a great number of species of this subgenus.

The mouth of some is situated near the anterior extremity of the head. The antennæ are very small, inserted laterally, and at a distance from the eyes(2).

In the others, the mouth is nearly central; the antennæ are placed close to the eyes, and their length about equals half that of the head(3)

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(1) Zool. Miscell., CXLVI; *P. suis*, Panz., Faun. Insect. Germ. LI, xvi, 1. The *P. cervi*, Panz., Ib., xv, belongs to the genus *Melophagus*, of the Diptera.

(2) *Pediculus sternæ hirundinis*, L.; De Geer, Insect., VII, iv, 12:—*Ped. corvi coracis*, L.; De Geer, Ib., ii;—*Ricinus fringillæ*, De Geer; Ib., 5, 6, 7;—*Ped. tinnunculi*, Panz., Ib., xvii.

(3) *Ricinus gallinæ*, De Geer, Ib., 15—on the Cock, Partridge, and Pheasant;—

The celebrated professor Nitzsch has profoundly studied the internal as well as external organization of these animals, as may be seen by referring to his paper on the Epizoic Insects, in the Magasin der Entomologie of M. Germar. The genus Pediculus, properly so called, or that whose species are provided with a sucker, is arranged by him with the Epizoic Hemiptera. The Ricini of De Geer and others, or the Nirmi of Hermann, Jun., that is to say, the species furnished with mandibles and jaws, are referred to the Orthoptera, and collectively designated by the term *Mallophaga.* Two genera of this division approach the preceding ones in the circumstance of living on the Mammalia—such are TRICHODECTES and GYROPUS. In the first the maxillary palpi are null or indistinct, and the antennæ filiform, and composed of three joints. The species of this genus are found on the Dog, Badger, &c. In the second the maxillary palpi are apparent, and the antennæ, thicker towards the end, consist of four joints. The mandibles have no teeth; there are no labial palpi, and the four posterior tarsi have but a single terminal hook. These last characters distinguish it from another genus, also furnished with visible maxillary palpi, quadriarticulated antennæ thicker near the extremity, and an anterior mouth, that of LIOTHEUM. Here the mandibles are bidentate, the labial palpi distinct, and all the tarsi terminated by two hooks. The species are found on various Birds, whereas the Gyropi live on the Guinea-pig. A fourth and last genus, the species of which are exclusively confined to Birds, is that of PHILOPTERUS. The antennæ consist of five joints, the third of which, in the male, frequently presents a branch that forms a forceps with the first; these organs are filiform. The maxillary palpi are invisible. The tarsi have two hooks at their extremity, but they do not diverge like those of the Liothea. Besides this, the males here have six testes, three on each side, and their four biliary vessels are thickened near the middle of their length. Those of the Trichodectes and Philopteri do not exhibit this enlargement, and they have but four testes, two on each side. In these two genera there are also ten ovaries, five on each side; in such of the female Liothea as this savant could find them, he saw but six, three on each side. He has no positive knowledge of the number of those in the female Gyropi, nor of that of the testes in the males. In all these genera the thorax is bipartite, that is, the prothorax and the mesothorax compose the apparent trunk, and the third division, or the

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R. emberizæ, De Geer, Ib., 9;—*R. mergi,* De Geer, Ib., 13, 14;—*R. canis,* De Geer, Ib., 16;—*Pediculus pavonis,* Panz., Ib., xix; Lat., Hist. Nat. des Fourm., 389, xii, 5. See also Panz., Ib., pl. xx—xxiv. His *Pediculus ardeæ,* XVIII, appears to be the same as the *Ricin du plongeon,* De Geer, IV, 13.

metathorax, is united to the abdomen and confounded with it. M. Kirby was the first, I think, who thus designated this segment; but Nitzsch, on the other hand, seems to have first employed the others(1). The limits of this work interdict any exposition of the subgenera he has established. We will merely remark that the one he calls *Goniodes*, the fourth subgenus of Philopterus, is exclusively proper to the Gallinaceæ. In the collection of memoirs which terminates our Histoire des Fourmis, we have minutely described a species of Ricinus—Philopterus, Nitzsch.

M. Leon Dufour, with the *P. meliteæ* of Kirby, previously well observed by De Geer, who considered it as the larva of the *Meloe proscarabæus*, as well as by that celebrated entomologist, has formed a new genus—*Triongulin des andrenettes*—the characters of which he has figured and published in the Ann. des Sc. Nat. XIII, 9, B. If this Insect be not the larva of that Meloe, as in the opinion of M. Kirby, there is no doubt but that it forms a peculiar subgenus in the order of the Parasita; but according to the researches of MM. Lepeletier and Servile, the idea of De Geer is confirmed.

ORDER IV.

SUCTORIA(2).

The Suctoria, which constitute the last order of the Aptera, have a mouth composed of three(3) pieces, enclosed between two articulated laminæ, which, when united, form a cylindrical or conical proboscis or rostrum, the base of which is covered by two scales. These characters exclusively distinguish this order from all others, and even from that of the Hemiptera, to which, in these respects, it approximates the most closely, and in which these Insects were placed by Fabricius. The Suctoria, besides, undergo true metamorphoses, analogous to those of several Diptera, such as the Tipulæ.

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(1) See our general observations on the class of Insects.

(2) *Siphonaptera*, Lat.

(3) Rœsel represents but two; Kirby and Straus, however, have observed one more. According to the latter, the two scales which cover the base of the rostrum are palpi.

This order consists of a single genus, that of

PULEX, Lin.

The body of the Flea is oval, compressed, invested by a firm skin, and divided into twelve segments, three of which compose the trunk, that is short, and the others the abdomen. The head is small, strongly compressed, rounded above, and truncated and ciliated before; it is furnished on each side with a small rounded eye, behind which is a fossula, in which we discover a little movable body furnished with small spines. At the anterior margin, near the origin of the rostrum, are inserted the pieces considered as the antennæ; they are scarcely the length of the head, and are composed of four almost cylindrical joints. The sheath or rostrum is divided into three segments. The abdomen is very large, each of its annuli being divided into or forming two laminæ, one superior and the other inferior. The legs are strong, the last ones particularly, fitted for leaping, spinous, the coxa and femur large, the tarsi composed of five joints, the last terminating in two elongated hooks; the two anterior legs are inserted almost under the head, the rostrum being placed midway between them.

The male, in coitu, is placed under the female, so that they face each other. The latter lays a dozen of white and slightly viscid eggs; the larvæ have no feet, are much elongated, resemble little worms, and are extremely lively, rolling themselves into a circle or spirally, and crawl with a serpentine motion; they are first white and then reddish. Their body is composed of a scaly head, without eyes, bearing two very small antennæ, and of thirteen segments, with little tufts of hairs, the last one terminated by two kinds of hooks. Some small movable pieces are observed in the mouth, by which these larvæ push themselves forwards. After remaining twelve days under this form, they enclose themselves in a little silky cocoon in which they become pupæ, and from which, in about the same time, they issue in their perfect state.

Pulex irritans, L.; Rœs., Insect., II, ii, iv. The common Flea feeds on the blood of Man, the Dog, Cat, &c.; the larvæ live in the dirt that is collected under the nails of filthy individuals of the human family, in the nests of Birds, particularly of Pigeons, where they fasten to the neck of their young, and suck their blood to such a degree as to become perfectly red.

Pul. penetrans, L.; Catesb., Carol. III, x, 3(1). This species, called the *Chique* or *Chigre* in America, most probably forms a particular genus. It insinuates itself under the nails of the toes and the skin of the heel, where, by the speedy development of the ova contained in a membranous sac under the venter, it soon acquires a size equal to that of a pea.

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(1) M. Duméril has given an excellent figure of this animal in his work, Consid. Gen. sur la Classe des Insectes, and in the Dict. des Sc. Naturelles.

The numerous family, to which it gives birth, produces a malignant ulcer, that is cured with difficulty, and which sometimes proves mortal. These difficulties are generally avoided by rubbing the feet with bruised tobacco leaves and other bitter and acrid plants. The Negroes extract the animal from its domicil with much address.

Various Quadrupeds and Birds are infested with Fleas which appear to differ specifically from these two.

ORDER V.

COLEOPTERA(1).

Coleopterous Insects have four wings, the two superior of which resemble horizontal scales, joining in a straight line along the inner margin; the inferior wings are merely folded transversely and covered with others, which form cases or covers for them, usually denominated the *elytra*(2).

Of all Insects, these are the most numerous and the best known. The singular form and brilliant colouring of many species, the volume of their bodies, the greater solidity of their teguments, which facilitates their preservation, the numerous advantages which the study derives from the various forms of their external organs, &c., have secured to them the particular attention of naturalists.

Their head presents antennæ of various forms, and almost always composed of eleven joints; two compound eyes, but none simple(1); and a mouth consisting of a labrum, two mandibles, usually of a scaly substance, two jaws, each furnished with one or two palpi, and of a labium formed of two pieces, the mentum and the ligula, and accompanied by two palpi, commonly inserted into the latter. Those of the jaws, or when they have two, the exterior ones, never consist of more than four joints; those of the lip usually have three.

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(1) The *Eleutherata*, Fab.

(2) For the anatomical characters of the Coleoptera, see Ann. des Sc. Nat. VIII, p. 36, where a resumé is given by M. Duméril.

The anterior segment of the trunk, or that which is before the wings, usually called the *corselet*, bears the first pair of legs, and is much larger than the two other segments(2). The latter are intimately united with the base of the abdomen, and their inferior portion or *pectus* gives insertion to the second and third pairs of legs(3). The second, on which the *scutellum* is placed, is narrowed before, and forms a short pedicle which fits into the interior of the first, and serves as a pivot, on which it moves.

The elytra and wings arise from the lateral and superior edges of the metathorax. The elytra are crustaceous, and when at rest, join along their internal margin, and always horizontally. They almost always conceal the wings, which are wide and transversely folded. Several species are apterous, but the elytra still exist. The abdomen is sessile or united to the trunk in its greatest width. It is composed externally of six or seven annuli, membranous above, or less solid than underneath. The number of joints in the tarsi varies from three(4) to five.

The Coleoptera undergo a complete metamorphosis. The larva resembles a Worm, having a scaly head, a mouth analogous to that of the perfect Insect in the number of its parts, and usually six feet. Some few species are destitute of them or have merely simple mammillæ.

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(1) In some of the Brachélytra two small yellowish points have been observed, that have been taken for ocelli: but without, as I imagine, any careful examination, particularly as the Forficulæ, a genus of the Orthoptera that is nearest to the Coleoptera, exhibit none.

(2) The internal membrane, on each side, behind, presents a stigma, a character which I believe had not yet been observed, although it was presumed to exist.

(3) The mesothorax is always short and narrow, and the metathorax frequently spacious, and longitudinally sulcated in the middle.

(4) If we may judge from analogy, the Coleoptera, termed *Monomera*, have probably three joints in the tarsi, the two first of which escape observation; this section and that of the *Dimera* have been suppressed.

The pupa is inactive and takes no nourishment. The habitations, mode of life, and other habits of these Insects, in both states, greatly vary.

I divide this order into four sections, according to the number of joints in the tarsi.

The first comprises the PENTAMERA, or those in which all the tarsi consist of five joints, and is composed of six families, the two first of which are distinguished from the others by a double excremental apparatus(1).

FAMILY I.

CARNIVORA(2).

Two palpi to each maxilla, or six in all; antennæ almost always filiform or setaceous, and simple.

The maxillæ are terminated by a scaly hook or claw, and the interior side is furnished with cilia or little spines. The ligula is fixed in an emargination of the mentum. The two anterior legs are inserted on the sides of a compressed sternum, and placed on a large patella; the two posterior have a stout trochanter at their origin; their first joint is large, appears to be confounded with the post-pectus, and forms a curvilinear triangle, with the exterior side excavated.

These Insects pursue and devour others. Several have no wings under their elytra. The anterior tarsi in most of the males are dilated or widened.

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(1) According to M. Dufour the *Silphæ*, a genus of our fourth family, also present one; it is unique, however, or but on one side.

(2) *Carnassiers*, Cuv.—*Adephage*, Clairv. This family, which is one of the largest of the Coleoptera, already illustrated by the labours of Weber, Clairville, and Bonelli, with respect to the method, will finally be reduced to order, as regards the species, if Count Dejean continue his "Species des Coléoptères," four volumes of which are now published, a work remarkable for the exactness of its descriptions.

The larvæ also are very carnivorous. Their body is usually cylindrical, elongated, and composed of twelve rings; the head, which is not included in this supputation, is large, squamous, armed with two stout mandibles, recurved at the point, and presents two short and conical antennæ, two maxillæ divided into two branches, one of which is formed by a palpus, a ligula bearing two palpi, shorter than the others, and six small simple eyes on each side. The first annulus is covered by a squamous plate; the others are soft, or have but little firmness. Each of the three first bears a pair of legs, the extremity of which curves forwards.

These larvæ differ according to the genus. In those of the Cicindelæ and of the Aristus bucephalus, the top of the head is very concave in the middle, whilst its inferior portion is convex. They have two small simple eyes, on each side, much larger, and similar to those of the Lycosæ. The superior plate of the first segment is large, and forms a semicircular shield. There are two hooked mammillæ on the back of the eighth annulus; the last has no remarkable appendage.

In the other larvæ of this family which are known to us, those of Omophron excepted, the head is weaker and more equal. The simple eyes are very small and similar. The squamous piece of the first ring is square, and does not project from the body. There are no mammillæ on the eighth; and the last is terminated by two conical appendages, exclusive of a membranous tube formed by the prolongation of that part of the body which contains the anus. These appendages, in the larvæ of Calosoma and Carabus, are horny and dentated. In those of Harpalus and Licinus, they are fleshy, articulated and longer. The body of the larva of a Harpalus is somewhat shorter, and the head a little larger. The mandibles of both approach the form of those of the perfect Insect. The larva of the Omophron borde, according to the observations of Desmarest, has a conical form, a large head, with two very stout mandibles and but two eyes; the posterior extremity of

Of these latter, those species whose labial palpi are evidently longer than the external maxillary palpi, and with the penultimate joint longer than the last, form two subgenera.

MEGACEPHALA, Lat.

Labrum very short and transversal; first joint of the labial palpi much longer than the second, and projecting beyond the mentum(1).

OXYCHEILA, Dej.

The labrum forming an elongated triangle, first joint of the labial palpi not much longer than the second, and not extending beyond the emargination of the mentum(2).

In the following species the labial palpi are at most about the length of the external maxillary palpi, the last joint is longer than the penultimate. They also form two subgenera.

EUPROSOPUS, Lat. Dej.

The third joint of the labial palpi thicker than the last; the three first joints of the anterior tarsi of the males somewhat elongated, flattened, carinated beneath, and equally ciliated on both sides; very large eyes. They keep on trees(3).

CICINDELA, Lat.

The true Cicindelæ only differ from the Euprosopi in the third joint of the labial palpi, which is not much thicker than the fourth; and in their anterior tarsi, whose three first joints, in the males, are much elongated, more strongly ciliated on the internal side than the external, and are destitute of a carina beneath.

Their body is usually of a darker or lighter green, mixed with various brilliant metallic tints; the elytra are marked with white spots. They prefer dry, warm situations, run with considerable swiftness, take wing the moment they are approached, but alight at a short distance. If pursued they have recourse to the same means of escape.

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(1) *Cicindela megalocephala*, Fab.; Oliv., II, 33, 11, 12; *C. carolina*, Oliv. Ib., xi, 2;—*Megacephala euphratica*, Hist. Nat. des Coleop. d'Eur., I, 1, 2. For the other species, see Dejean, Species des Coleoptéres, I, p. 6, et seq.

In the United States, *Meg. carolina* and *Meg. virginica*, both beautiful species. *Am. Ed.*

(2) *Cicindela tristis*, Fab.; Oliv., Coleopt., II, 33, iii, 35; *Oxycheila tristis*, Dej., Species Gener. des Coleop. I, p. 16;—*Cicindela bipustulata*, Lat.; Voy. de Humb. et Bonpl.; Obser. d'Anat. et de Zool., No. XIII, xvi, 1, 2.

(3) *Cicindela 4-notata*, Hist. Nat. des Coleop. d'Europ., I, 1, 6; *Euprosophus 4-notatus*, Dej., Spec. Gener. des Coleopt. I, p. 151.

The larvæ of the two species indigenous to France, the only ones that have been observed, excavate in the earth a deep cylindrical hole, an operation which they effect with their mandibles and feet. To empty it, they place the detached particles on their head, turn about, climb up the ascent little by little, resting at intervals and clinging to the walls of their domicil by means of their two dorsal mammillæ; when they arrive at the mouth of the aperture they throw down their burden. While in ambuscade, the plate of their head exactly closes the entrance of their cell, and is on a level with the ground. They seize their prey with their mandibles, and even dart upon it, and by a see-saw motion of their head precipitate it to the bottom of the hole. Thither also they quickly retreat on the least intimation of danger. If they are too confined, or the soil is not of a proper nature, they construct a new habitation elsewhere. Such is their voracity that they devour other larvæ of the same species, which have taken up their abode in their vicinity. When about to change their tegument or to become pupæ, they close the opening of their cell. Part of these observations were communicated to me by the late M. Miger, who had carefully studied many larvæ of Coleoptera, and discovered several which had escaped the researches of naturalists.

C. campestris, L.; Panz., Faun. Insect. Germ. LXXXV, iii. About six lines in length; grass-green above; labrum white, slightly unidentated in the middle; five white points on each elytra. Very common in Europe in the spring.

C. hybrida, L.; Panz., Ib., iv. Two crescent-shaped spots, and a white band on each elytron; one of the spots at the exterior base and the other at the end; suture cupreous. In sand-pits, never mixing with the campestris(1). The

C. germanica and some other species have a narrower and more elongated form, and seem to constitute a particular section. The germanica, unlike the preceding, does not fly when about to be seized but escapes by running, which it does with great speed. M. Fischer, in his Entomography of Russia, has placed a Brazilian species (*T. marginatus*) in the subgenus Therates.

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(1) Add, *Cicindela sylvatica*, L.; Clairv., Entom. Helv., II, xxiv, A;—*C. sinuata*, Fab.; Clairv., Ib., B, b;—*C. germanica*, L.; Panz., Faun. Insect. Germ. VI, v. For these and other European species, the Hist. Nat. des Coleop. d'Eur. of Lat. and Dej., fascic. I, p. 37, et seq.—and in general the Species Gener. of Count Dejean; see also the work of Curtis on English Insects.

Add of American species the *C. unicolor*, *6-guttata*, *rugifrons*, *patruela*, *concentanea*, *signata*, *blanda* and the *C. lepida*, Le C., nov. spec. ined.; the *C. obliquata*, *repanda*, *albohirta*, *laticincta*, *formosa*, *marginata*, *variegata*, *unipunctata*, *marginipennis*, *abdominalis*, 12-*guttata*, *flexuosa*, *obscura*, *pusilla*, *punctata*, *pulchra*, and the *C. denticulata hæmorrhoidalis* and *splendida*, new species of Hentz. *Am. Ed.*

All these species are winged; but some apterous ones are known whose abdomen is also narrower and more oval, and in which the tooth of the emargination of the mentum is very small and hardly sensible. Such is the one figured in our Hist. Nat. des Coleop. d'Europe, I, i, 5, under the name of *coarctata.* Count Dejean, Spec. Gen. des Coleop., II, p. 434, has formed a new genus with them, that of *Dromica*(1).

Sometimes the body is long and narrow, the thorax elongated, in the form of a knot, narrowed before; the third joint of the two anterior tarsi of the males, pallet-shaped and projecting internally; the fourth is inserted exteriorly near its base.

CTENOSTOMA, Klüg.—*Caris,* Fisch.

This subgenus appears to be peculiar to the intertropical regions of South America. The head is large, with almost setaceous antennæ nearly as long as the body; the external palpi are very salient, and terminated by a thicker joint elongated and pyriform; the penultimate joint of the external maxillary palpi shorter than the following one; the two first joints of the labial palpi very short, and the terminal lobe of the jaws without any apparent unguiculus at the extremity. The abdomen is oval, strangulated at base and pediculated. The legs are long and slender.

The Ctenostomæ approach the Megacephalæ in the size of their palpi, and in other respects approximate to the Tricondylæ and Therates(1).

The others have no tooth in the middle of the emargination of the mentum. The labial palpi are contiguous at their origin, with the first joint obconical or in the form of a reversed pyramid, and dilated or prolonged interiorly in the manner of an angle or tooth; the exterior maxillary palpi hardly extend beyond the labrum. These species have been distributed into three subgenera.

THERATES, Lat.—*Eurychile,* Bonel.

The Therates in their general form resemble the true Cicindelæ, but are distinguished from them, as well as from all other analogous subgenera, by their internal maxillary palpi, which are very small and acicular. The tarsi are similar in both sexes, with the penultimate joint cordate, unemarginate, and simply excavated above for the insertion of the last.

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(1) See the Entomologiæ Brasilianæ Specimen of Klüg; the Spec. Gen. des Coleop. of Count Dejean, I, p. 152, et seq., and the Supp. to vol. II of the Hist. Nat. des Coleop. d'Eur., fascic. I, p. 35; the Entom. Imp. Russ. of M. Gotthelf Fischer, I; Genet. Insect. p. 98.

These Insects are exclusively proper to the most eastern islands of Asia, as Java, those of Sunda, and such as are to the north of New Holland.(1)

In the two following subgenera, both proper to the East Indies, or the remotest of the Oriental islands, the body is narrow and elongated, and the thorax almost cylindrical, or in the form of a knot. The third and fourth joint of the tarsi is prolonged interiorly in the manner of a lobe.

Colliuris, Lat.—*Collyris*, Fab.

Furnished with wings; antennæ thickest near the end; last joint of the labial palpi almost securiform, and the penultimate frequently curved; thorax nearly cylindrical, narrowed and strangulated before, with the anterior margin widened; abdomen almost cylindrical, widened and enlarged posteriorly; tarsi similar in both sexes, the penultimate joint prolonged obliquely on the inner side, as large as the preceding one; the latter in the form of a reversed triangle with acute angles(2).

Tricondyla, Lat.

Destitute of wings; antennæ filiform; penultimate joint of the labial palpi longest and thickest; thorax in the form of a knot, subovoid, strangulated, truncated, and turned up at both ends; abdomen oval, oblong, narrowed towards the base, and slightly gibbous posteriorly; three first joints of the anterior tarsi dilated in the males, the third obliquely prolonged on the inner side in the manner of a lobe; the fourth nearly similar, but much smaller and less prolonged(3).

The second tribe, or the Carabici, Lat., comprehends the genus

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(1) See Lat., Dej. Hist. Nat. des Coleop. d'Eur., fascic. I, p. 63; the Spec. Gen. des Coleop. Dej., I, 57, and the Supp. to vol. II; and particularly the memoir of Bonelli on this genus.

(2) See the works just quoted. The species which I have described and figured under the name of *longicollis* is distinct from the Fabrician species of the same appellation; it is the *Colliuris emarginata*, Dej., Spec. Gener., I, p. 165.

(3) Idem

CARABUS, Lin.

Where the maxillæ simply terminate in a point or hook, without an articulated extremity.

Their head is usually narrower than the thorax, or, at most, of the same width; their mandibles, those of a few excepted, have no dentations or but very few; the ligula usually projects, and the labial palpi exhibit but three free joints(1). Many of them are destitute of wings, only having elytra. They frequently diffuse a fetid odour, and eject an acrid and caustic liquid from the anus. Geoffroy believed that the ancients designated Carabici under the name of *Buprestes*, Insects which they considered as highly poisonous, particularly to Oxen(2).

The Carabici conceal themselves in the ground, under stones, chips, bark of old trees, &c., and are mostly very active. Their larvæ have the same habits. This tribe is very numerous, and forms a most difficult study.

We will compose a first general subdivision with those, the termination of whose exterior palpi is not subulate; their last joint is not united with the preceding one to form either an oval body acutely pointed at the end, or a conoïd terminated by a slender and acicular point.

These Carabici may be subdivided into those whose two anterior tibiæ have a deep notch on the inner side, separating the two spines which are usually placed near each other at the extremity of this side, and into those where these tibiæ present no emargination, or if any, a mere oblique, linear canal, which does not reach their anterior side.

Of this subdivision we will make several sections:

1. The TRUNCATIPENNES, so called because the posterior extremity of their elytra is almost always truncated. The head and thorax are narrower than the abdomen. The ligula is most commonly oval or square, and is rarely accompanied on the sides by salient divisions.

The hooks of the tarsi, in some, are simple or not dentated, but arranged like the teeth of a comb.

We will commence with those in which the head is not abruptly narrowed at its posterior extremity, and is not attached to the thorax by a sort of suddenly formed neck, or by a species of patella.

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(1) In Cicindela the radical joint is free, and it is on this account that the palpi consist of four; but here it is entirely adherent and forms but one base which is not counted.

(2) See the genus Meloë.

The thorax is always in the form of a truncated heart. The exterior palpi are never terminated by a much larger and securiform joint. The two anterior tarsi of the males are not dilated, or if so, but very slightly; the penultimate joint of these and the other tarsi is never deeply bilobate.

The three following subgenera have a common negative character: that of being destitute of wings.

ANTHIA, Web. Fab.

An oval, horny ligula, advancing between the palpi nearly to their extremity.

The labrum frequently large and dentated or angular.

The exterior palpi filiform; the last joint almost cylindrical or forming a reversed and elongated cone. No tooth in the emargination of the mentum. The abdomen oval, and most frequently convex; elytra almost entire, or but slightly truncated.

These Insects, as well as those of the ensuing subgenus, have a black body spotted with white, a colour formed by down; they inhabit the deserts and similar localities of Africa(1) and some parts of Asia. According to the late M. Leschenault de Latour, the Anthiæ, when irritated, discharge a caustic fluid from the anus. The species generally are large, and in the males of some the thorax is more or less dilated posteriorly and terminates by two lobes(2).

GRAPHIPTERUS, Lat.—*Anthia*, Fab.

The Graphipteri were formerly confounded with the Anthiæ, but differ from them in their ligula, which, the middle part excepted, is entirely membranous; and in their compressed antennæ, whose third joint is much longer than the others. Besides this, their abdomen is always flattened and orbicular, and one of the two spines terminating the posterior tibiæ is always laminiform and much longer than the other.

The species of this subgenus are exclusively proper to Africa, and smaller than the preceding(3).

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(1) Although several Insects of the north of Africa have been discovered in the south of Spain and Italy, not a solitary species of Anthia or Graphipterus has ever been found there.

(2) See Hist. Nat. des Coleop. d'Eur., fascic. II; the Species des Coleop., Dej., I; the excellent Synonymia Insectorum of Schœnherr; and the zoological portion of the Voy. de Cailliaud, where I have described and figured the Insects collected by him in Africa.

(3) See Hist. Nat. Coleop. d'Eur., fascic. II, and the Species des Coleop., I,

APTINUS, Bon.—*Brachinus*, Web. Fab.

The last joint of the exterior palpi somewhat thicker, that of the labials particularly; a tooth in the middle of the emargination of the mentum. The ligula is similar to that of the Graphipteri, but the lateral divisions form a small pointed projection. What particularly distinguishes this, as well as the following subgenus, is the fact, that the oval and thick abdomen contains organs which secrete a caustic liquor of a penetrating odour, that issues from the anus with a crepitus and instantly evaporates. This fluid produces a discoloration of the skin similar to that caused by nitric acid, and if the species be large, a burn, accompanied with pain. M. Leon Dufour has described the organs which secrete it(1).

These Insects are frequently found in society, at least in the spring, under stones. They employ the above mentioned mode of defence to terrify their enemies, and can repeat the discharge a number of times. The larger species inhabit tropical and other hot climates to the limits of the temperate zone.

Apt. balista, Dej., Hist. Nat. des Coleop. d'Eur., II, viii, 1; *Brachinus displosor*, Duft. From five to eight lines in length; black, with a fulvous thorax and sulcated elytra. Navarre and various parts of Spain and Portugal.

Apt. pyrenæus, Dej., Hist. Nat. des Coleop. d'Eur., II, viii, 3. From three to four lines in length; deep black; antennæ and palpi fulvous; feet of a russet yellow(2). The elytra are sulcated. It was discovered by Count Dejean in the department of the Pyrénnées-Orientales.

BRACHINUS, Web. Fab.

The Brachini only differ from the Aptini in being furnished with wings, and in the circumstance of the emargination of their mentum having no tooth.

Some, generally the largest and mostly foreign to Europe, have their elytra very sensibly sulcated or ribbed. Of this number is a species common to the Antilles and Cayenne, the

Brach. complanatus, Fab.; *Carabus planus*, Oliv. III, vi, 63. From six to eight lines in length; russet yellow; the elytra black, no humeral point, a sinuous band traversing their middle,

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Dej. The *Anthia exclamationis*, Fab., is a Graphipterus, figured Dict. d'Hist. Nat. X, E, 2, 7, under the name of *trilinée*.

(1) Mém. sur le *Brachine tirailleur*, Ann. du Mus. d'Hist. Nat. XVII, 70, 5, and the Ann. des Sc. Nat. VI, p. 320.

(2) See Hist. Nat. des Coleop. d'Eur., and the Species des Coleop., Dej., I.

and a russet yellow spot at their extremity: their external margin of the same colour; posterior angles of the thorax prolonged into a point.

The elytra of the others are smooth or but slightly sulcated. In the environs of Paris the following species are usually to be found.

Brach. crepitans, Fab.; Hist. Nat. des Coleop. d'Eur., II, viii, 6; Panz., Faun., Insect. Germ., XX, 5. Average length four lines; fulvous; elytra sometimes deep blue, at others bluish-green, and slightly sulcated; antennæ fulvous, but the third and fourth joints blackish; the pectus, its middle excepted, and the abdomen, black. This species has been confounded with the *explodens* of Duftschmid—Hist. Nat. des Coleop. d'Eur., II, viii, 7—which is also very common. It is but half the size of the crepitus, with blue and almost smooth elytra. The *glabratus*, Bonelli, only differs from it in the absence of the spots on the antennæ.

Brach. sclopeta, Fab.; Hist. Nat. des Coleop. d'Eur., II, ix, 3. Very similar to the last, but distinguished from it as well as from the preceding ones by the suture of the elytra, which is fulvous-red from the base to the middle. The body also is wider in proportion, and of the same colour above and beneath.

Brach. bombarda, Illig.; Hist. Nat. des Coleop. d'Eur., II, ix, 2. This species is intermediate between the last and the first. A fulvous spout surrounds the scutellum, but does not extend along the suture.

Brach. exhalans, with elytra of an obscure blue, and four yellowish spots, and *Brach. causticus*, all fulvous, with a band along the suture and posterior spot blackish—are found in the department of Herault(1).

In the Hist. Nat. des Coleop. d'Eur., we placed the genus *Catascopus* of Kirby next to Brachinus. A more recent examination leads us to think that it rather belongs to the *Simplicimani*. The posterior extremity of the elytra, it is true, does offer a deep emargination, but it terminates in a point towards the suture, and is not truncated. Several species of this division also present the same sinus, although less deep and acute.

Between the Brachini and the Catascopi, Count Dejean—Species I, p. 226—places the genus *Corsyra* of Steven, the type of which is the *Cymindis fusula* of the Russ. Entomog., of Fischer, I, xii, 3. It differs from the latter in its tarsi, the hooks of which are simple. The body also is flattened, as in the preceding and other neighbouring subgenera, tolerably broad, with filiform palpi, unidentated mentum and transverse labrum; the thorax is wider than the head, and nearly semi-orbicular.

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(1) See op. cit. ut sup.

Add of American species *Brach. alternans*, *quadripennis*, *fumans*, *cephalotes*. *Am. Ed.*

But one species is known.

The other Carabici of the same division with equally simple hooks are removed from the preceding by the form of their head, which is suddenly narrowed immediately after its origin, presenting the appearance of a neck or rotula.

First come those in which the tarsi of both sexes are identical, sub-cylindrical or linear, and whose penultimate joint, at most, is deeply notched or bilobate.

Sometimes the exterior palpi are filiform or but slightly enlarged at the end, with the last joint verging to an oval; the head has the same form and becomes gradually narrowed behind the eyes. The first joint of the antennæ is always short or but slightly elongated. The thorax is always narrow and elongated. The body is thick. The emargination of the mentum has a central tooth. The ligula is almost square, and its paraglossæ are salient and pointed.

CASNONIA, Lat.—*Ophionœa*, Klüg.

The thorax almost like a truncated cone, or a cylinder narrowed anteriorly(1).

LEPTOTRACHELUS, Lat.

Thorax cylindrical, and without any sensible contraction anteriorly; elytra entire or not truncated; penultimate joint of the tarsi bilobate(2).

ODACANTHA, Payk. Fab.

The same kind of thorax, but the elytra are truncated and the joints of the tarsi entire.

Odac. melanura, Fab.; Clairv., Entom. Helv. II, v; Hist. Nat. des Coleop. d'Eur., II, x, 6. The type of the genus; three lines in length; greenish-blue; elytra, the extremities excepted, russet-yellow; base of the antennæ, pectus, and a greater portion of the feet of the same colour; ends of the elytra blackish-blue. It frequents the neighbourhood of water, and is more particularly found in the north of France, Germany and Sweden(1).

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(1) See Entom. Brasil., of Klüg; the Spec. Gener., of Dej., I, p. 170; Hist. Nat. des Coleop. d'Eur., fascic. II, vii, 6. The species figured—*C. cyanocephala*—from the penultimate joint of the tarsi forms a particular division. It is found in Bengal. All the others, the principal of which is the *Attelabus pensylvanicus*, L., belong to America and have all the joints of the tarsi entire.

American species, *C. pensylvanica*, *rufipes*. *Am. Ed.*

(2) *Odacantha dorsalis*, Fab.

Sometimes the exterior palpi are terminated by a thicker triangular joint, or one resembling a reversed cone; the head, directly behind the eyes, is suddenly narrowed, and has a triangular form, or that of a heart.

Some, in which the body is flattened, placed by Fabricius among his Galeritæ, have all the joints of the tarsi entire, the thorax cordate and posteriorly truncated, and the mandibles as well as the maxillæ of an ordinary length or but slightly salient.

The first joint of the antennæ forms a reversed and elongated cone. The ligula is square, and its paraglossæ are usually as long as itself; the middle of the emargination of the mentum is furnished with a tooth. These Carabici, of which the species indigenous to Europe are found under stones, bark, and most commonly in the vicinity of water, form the three following subgenera.

ZUPHIUM, Lat.

First joint of the antennæ at least as long as the head; exterior maxillary palpi much elongated(2).

POLISTICHUS, Bon.

First joint of the antennæ, as in the following subgenus, shorter than the head; maxillary palpi of the ordinary length; second, third and fourth joints of the tarsi, those of the two anterior legs particularly, short and nearly orbicular; the ligula terminated superiorly by a straight margin, its paraglossæ salient, and resembling narrow, arcuated and pointed auriculæ(3).

HELLUO, Bon.

This subgenus is only distinguished from Polistichus by the entirely corneous ligula, which is rounded at the superior extremity, and without any distinct paraglossæ. The species are all foreign to Europe(1).

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(1) The *Odacantha tripustulata*, Fab., is a species of Notoxus.

(2) *Galerita olens*, Fab.; Clairv. Entom. Helv. II, xvii, A, a; Hist. Nat. des Coleop. d'Eur., fasc. II, x, 3.

(3) *Galerita fasciolata*, Fab.; Clairv., Ib., B, b; Hist. Nat. des Coleop. d'Eur., Ib., 4;—*Polistichus discoideus*, Ib. 5. See the Spec. des Coleop., Dej. I, p. 194.

The others, which, with those that immediately follow, appear to approximate to the Brachini(2), have the penultimate joint of all the tarsi strongly bilobate; the mandibles and maxillæ long, narrow, and projecting; the body thick; the head in the form of a narrow and elongated triangle; the thorax almost cylindrical, and slightly narrowed posteriorly.

The first joint of the antennæ is long and narrowed at base. The mentum is nearly lunate, and is destitute of a tooth in the middle of the emargination. The ligula is salient, narrow, almost linear, and terminated by three stout spines; it has two small paraglossæ. The under part of the tarsi is covered with down. Such are the characters of

DRYPTA, Lat. Fab.

All the species known belong to the eastern continent and to New Holland. Two inhabit Europe, and are always found on the ground.

The most common is the *Drypta emarginata*, Fab.; Clairv. Entom. Helv. II, xvii; Hist. Nat. des Coleop. d'Eur., fasc. II, x. 1. It is about four lines in length, and of a beautiful azure-blue; the antennæ, mouth and legs, fulvous; extremity of the first joint of the antennæ and the middle of the third, blackish; elytra with punctate striæ. More common in the south of France than the north. M. Blondel Jun., however, has found it in abundance in a locality near Versailles(3).

We now come to the Carabici, very analogous to the preceding ones in their divisional characters, but removed from them by the form of their tarsi. The four first joints, or at least those of the anterior tarsi of the males, are greatly dilated and bifid; the penultimate of all, and in both sexes, is always emarginated or dilated. The exterior palpi and the first joint of the antennæ always long.

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(1) *Helluo costatus*, Hist. Nat. des. Coleop. d'Eur., fascic. II, vi, 5;—*Galerita hirta*, Fab. See the Species Gener. Dej. I, p. 283.

An undescribed species from Brazil appears to me to form a new subgenus by its filiform palpi, of which the last joint is cylindrical.

(2) The Dryptæ are also allied to Cychrus, and seem to connect the Cicindelitæ with the Carabici Grandipalpi. Several sections of this family seem to connect themselves with the Cicindelæ like so many branches. Most of the other families of Insects are similarly situated, or form ramified trunks—in a word, continuous series do not exist in nature.

(3) For the other species, see Hist. Nat. des Coleop. d'Eur., fascic. II, x, 2; and the Species Gener. des Coleop. Dej. I, 182.

Trichognatha, Lat.

Ultimate joint of the exterior palpi in the form of a reversed cone, and elongated; a hairy triangular projection on the exterior side of the maxillæ; very long palpi; labrum bicrenate, with three obtuse teeth; summit of the ligula armed with three spines; the four posterior tarsi not dilated, at least in the females. The type of the genus (*T. marginipennis*) was brought from Brazil by the celebrated botanist M. de Saint-Hilaire.

Galerita, Fab.

The Galeritæ differ from the preceding subgenera in their exterior palpi, of which the last joint is triangular or securiform, and in the non-dilatation of the exterior side of the maxillæ.

The two anterior tarsi of the males are widened; the emarginations of the four first joints are acute, and their internal divisions are larger and more prolonged than the external. The summit of the ligula is tridentate, and its paraglossæ are very distinct. The emargination of the mentum is unidentate.

> Some species, such as the *Galerita occidentalis*, Dej.; *G. africana*, Id., by their oval head, and narrower and more elongated thorax, form a particular division. Most of them belong to America(1).

Cordistes, Latr.—*Calophæna*, Klüg.—*Odocantha*, Fab.

The exterior palpi filiform and terminated by an oval and pointed joint.

The four first joints of all the tarsi dilated and the first in the form of a reversed and elongated cone; lobes of the two following ones equal, straight, and pointed; the fourth in the form of a heart or reversed triangle, and unemarginate; its superior face is excavated for the reception of the next. The head is nearly oval(2).

We will terminate this section with those in which the hooks of

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(1) See the Hist. Nat. des Coleop. d'Eur.; and Spec. Gener. des Coleop. Dej., I. But one species of Galerita, the *G. americana*, Fab., *Carabus americanus*, Oliv., has yet been described from the United States. The rest are from Cayenne, Cuba, and one, the *africana*, Dej., from Senegal. *Am. Ed.*

(2) See the Hist. Nat. des Col. d'Eur., fascic. II; Spec. des Coleop., Dej., I; and chiefly the Entom. Brasil. Specim., of Klüg. All the known species belong to South America.

[illegible] in the manner of a comb, and com- [illegible] their oval or ovoid head separated from [illegible] and marked strangulation forming a sort of [illegible]ultimate joint of their tarsi is always di- [illegible] into two lobes; the preceding ones are broad, [illegible] heart or reversed triangle. The first joint of [illegible] slightly elongated. All the species known belong [illegible] world.

CTENODACTYLA, Dej.

Exterior palpi filiform, the last joint oval; body but slightly elongated and flattened; thorax almost cordiform, elongated, and truncated posteriorly(1).

AGRA, Fab.

Exterior maxillary palpi filiform; labial palpi terminated by a large triangular or securiform joint; the body long and narrow; thorax forming an elongated cone narrowed anteriorly. The mentum is suborbicular with a tooth in the middle of the emargination; the ligula nearly cylindrical, without very distinct paraglossæ(2).

Now the head is separated from the thorax by a very abrupt strangulation, in the form of a knot or patella(3). The joints of the tarsi are entire in several, and the first are rarely dilated. The body is always flattened. The paraglossæ are never salient, simply forming a membranous margin, rounded or obtuse at the end.

Here the thorax is isometric, or longer than it is wide, cordiform, and truncated posteriorly. The body is elongated. Such are

CYMINDIS, Lat.—*Cymindis*, *Anomœus*, Fisch.—*Tarus*, Clairv.—*Carabus*, Fab.

Exterior maxillary palpi filiform, or hardly thicker at the extremity, with the last joint cylindrical; the same of the labials, larger, almost securiform, or like a reversed triangle, at least in the males; the head not narrowed posteriorly; all the joints of the tarsi entire and nearly cylindrical(4).

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(1) *Ctenodactyla Chevrolatii*, Dej. Spec. I, p. 227. [The only species known, and type of the genus. From Cayenne. *Am. Ed.*]

(2) See Klüg's excellent Monograph of this genus: also the Hist. Nat. Col. d'Eur., and the Spec. des Coleop., Dej., I. All the species belong to intratropical America.

(3) Somewhat narrowed posteriorly in Demetrias and Dromius, but not fixed to the thorax by a patella.

(4) See Hist. Nat. Col. d'Eur., fascic. II, and III, and Spec. Gen. des Coleop. I.

Calleida, Dej.

Entirely similar to Cymindis, with the exception of the tarsi, the penultimate joint of which is bifid; in the preceding it is triangular. Peculiar to America(1).

Demetrias, Bon.

Analogous to Calleida in the tarsi, but having an oval head narrowed posteriorly, and all the exterior palpi nearly filiform, with the last joint almost ovoid or subcylindrical.

This subgenus, as well as the next, is composed of very small species, which usually frequent wet places. They are, nearly all, European(2).

Dromias, Bon.

Generally apterous; joints of the tarsi entire; otherwise similar to Demetrias(3).

There, the thorax is evidently wider than it is long, forms the segment of a circle, or resembles a heart, widely and transversely truncated posteriorly.

In some, the middle of the posterior margin of the thorax is extended backwards. Such is

Lebia, Lat.—*Lebia Lamprias*, Bon.

Exterior palpi terminating in a little larger and nearly cylindrical or oval joint truncated at the end; four first joints of the tarsi almost triangular, and the fourth more or less bifid or bilobate. One of the most common in Europe is

L. cyanocephala; Carabus cyanocephalus, L., Fab.; *Bupreste bleu à corselet rouge*, Geoff.; Panz., Faun. Insect. Germ., LXXV, 5; Hist. Nat. des Coleop. d'Eur., fascic. III, xii, 7. From two to two lines and a half long; blue or green and very lucent above; first joint of the antennæ, the feet and thorax, fulvous-red; extremity of the femur black; elytra marked with slight punctated striæ.

L. hæmorrhoidalis; Carabus hæmorrhoidalis, Fab.; Hist. Nat. des Coleop. d'Eur., fascic. III, xiii, 8. Not above two lines in length; body fulvous with black elytra, terminated by a yellowish-fulvous spot; elytra slightly striate, the striæ punctate with two more deeply impressed puncta near the third, commencing from the suture(1).

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(1) See op. cit.

Of American species, add the *marginata, decora, rubricollis* and *smaragdina*. *Am. Ed.*

(2) Idem.

(3) Idem.

In the following, the thorax terminates posteriorly in a straight line without any central projection.

PLOCHIONUS, Dej.

The antennæ almost granose; last joint of the labial palpi large, nearly securiform; four first joints of the tarsi short, in the form of a reversed heart, the fourth bilobate(2).

ORTHOGONIUS, Dej.

Similar tarsi; but the antennæ are filiform, and the external palpi terminated by an almost cylindrical joint(3).

COPTODERA, Dej.

The palpi of the preceding; antennæ more or less granose; three first joints of the anterior tarsi short and wide; the same of the four posterior tarsi, almost filiform; the penultimate joint of all bifid, but not bilobate. All the species quoted by Count Dejean are foreign to Europe, and belong, generally, to America(4).

2. The second section, that of the BIPARTITI,—*Scaritides*, Dej.—which in relation to their habits might also be styled *Fossores*, is composed of Carabici with elytra either entire or slightly sinuated at their posterior extremity; having frequently granose and geniculate antennæ; a broad head, large thorax, usually shaped like a cup or almost semi-orbicular, and separated from the abdomen by an interval which causes the latter to appear pediculated; the legs generally but slightly elongated, their tarsi usually short, and similar in the two sexes, or nearly so, without any brush beneath and simply furnished with ordinary hairs or cilia. The two anterior tibiæ are dentated, and in several palmated or digitated; the mandibles frequently strong and dentated. There is a tooth in the emargination of the mentum. They all keep on the ground, conceal them-

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(1) See op. cit.

Add of American species, the *Leb. analis*, *vittata*, *quadrivittata*, *fuscata*, *marginicollis*, *viridis*, and the *L. borea*, *solea*, and *grandis*, of Hentz, new species. *Am. Ed.*

(2) Op. cit.

(3) Dejean, Spec. I, p. 279: all the species foreign to Europe. Near this subgenus may perhaps be placed that of the *Hexagonia*, Kirby, Lin. Trans., XIV.

(4) In the United States: *C. signata*, and *C. ærata*, Dej. *Am. Ed.*

selves either in holes which they excavate, or under stones, and frequently only leave their retreat at night. They are usually of a uniform black. The larvæ of the Ditomus bucephalus, the only one that has been observed, has the form and mode of life of the larvæ of the Cicindelæ. They are more particularly proper to hot countries.

The three first subgenera, on account of their labial palpi, which are terminated by a larger, securiform or triangular joint, form a particular group; the last of these subgenera leads us to Scarites, whilst the first, which, as respects the absence of the emargination in the internal side of the two anterior tibiæ,' constitutes an exception, seems to connect itself with the first subgenera of the family. They all have stout and dentated mandibles. The external maxillary palpi terminate in a rather larger joint; the thorax has the form of a cup or truncated heart; the abdomen is pediculated.

Two of the subgenera of this group form a special subdivision. Their anterior tibiæ are not palmated. Their antennæ consist of cylindrical joints, or such as resemble reversed cones. The mentum covers the whole under part of the head as far as the labrum, and frequently exhibits no transverse suture at its base. The body is much flattened, and is apterous in several. They all belong to the eastern continent or to New Holland.

ENCELADUS, Bon.

The inner side of the anterior legs unemarginate; first joint of the antennæ but little elongated and almost cylindrical, the third shorter than the second; middle of the superior margin of the ligula projecting in the manner of an angle or tooth; thorax almost in the form of a broadly truncated heart, the posterior angles slightly dilated and pointed; labrum emarginate or nearly bilobate.

Encel. gigas, Bon., Mem. of the Acad. of Sc. of Tur. The only species described. From the coast of Angola.

SIAGONA, Lat.—*Cucujus*, *Galerita*, Fab.

A very decided emargination on the internal side of the two anterior tibiæ; the first joint of the antennæ elongated, forming a reversed cone, and the second shorter than the third; summit of the ligula straight, without any projection; thorax almost in the shape of a cup, nearly as long as it is broad, and without posterior projections; the labrum dentated.

Some are apterous and have an oval abdomen(1). The latter is oval in others, and truncated at base; these are furnished with wings. A new species has been discovered in Sicily by M. Lefevre. All the others, both of this and the preceding division, inhabit northern Africa or the East Indies(1).

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(1) *Siagona rufipes*, Lat. Gener. Crust. et Insect., I, vii, 9; *Cucujus rufipes*, Fab.;—*Siagona fuscipes*, Dej., Spec. I, p. 359.

The third subgenus, in its moniliform antennæ, the teeth on the exterior side of the two first tibiæ and in the ordinary proportions of the mentum, evidently approximates to Scarites.

Carenum, Bon.

Straight maxillæ without a terminal hook; summit of the ligula rounded; ultimate joint of the exterior maxillary palpi enlarged and double the length of the preceding one.

The only species known—*Scarites cyaneus*, Fab.—inhabits New Holland.

None of the other Carabici of this section exhibits labial palpi terminated by a larger and securiform joint: the last is in the form of a reversed and elongated cone, or almost cylindrical and smaller at base; the same joint of the exterior maxillary palpi is also nearly cylindrical; all these palpi are about the same thickness throughout or sometimes attenuated at the extremity.

A first very natural subdivision, which comprises the Scarites of Fabricius, the *cyaneus* excepted, consists of bipartite Carabici, whose anterior legs are palmated, or at least digitated at the end, that is to say, terminated exteriorly by a long point in the form of a spine, opposite to a very stout internal spur. Their antennæ are granose; the second joint as long as the following one, and frequently longer. The mandibles, those of a small number excepted, are stout, projecting, and angular, or dentated on the internal side. The labrum is very short, transversal, and crustaceous. The ligula is most frequently entirely corneous, bristled with hairs or cilia, broadly emarginate or widened at the summit, and with projecting lateral angles.

Some have very strong, projecting, and usually dentated mandibles; the anterior margin of the crustaceous labrum very dentate, the ligula short, not extending beyond the mentum, entirely horny or crustaceous, bristled with hairs, and widened at the superior margin. Their anterior tibiæ are always palmate. The species generally are large.

One of these subgenera,

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(1) The *Siag. atrata, depressa*, (*Galerita depressa*, Fab.), *Fejus*, (*Galerita flejus*, Fab.) *Schupelii*, Dej., Ib.;—*Scarites lævigatus*, Herbst. Col. CLXXV, 6.

PASIMACHUS, Bon,

Approximates to the last in the jaws, which are straight, and destitute of a terminal hook.

The antennæ are of equal thickness. The body is much flattened and oval, thorax cordiform, broadly truncated behind, almost as wide at its posterior margin as before and as the base of the elytra; this margin almost straight, and merely somewhat concave in the middle. This subgenus is peculiar to America(1).

According to Count Dejean—Spec., II, p. 471—after the Pasimachi, should come his genus SCAPTERUS, formed with a species from the East Indies, sent to him by one of the most zealous of the French entomologists, M. Guerin, to whom it is dedicated. Whether the maxillæ resemble those of the preceding subgenus I do not know, but the body is differently proportioned, being elongated and cylindrical. The antennæ are shorter in proportion than usual; the second joint is square, somewhat thicker than the others, which are short, almost square, and become gradually stouter.

In the following the maxillæ are arcuated and hooked at the end. The antennæ become sensibly thicker towards the extremity. The thorax is always separated posteriorly from the base of the elytra by a well marked space or angle.

Here the exterior palpi are terminated by an almost cylindrical joint, not narrowed into a point at the end.

ACANTHOSCELIS, Lat.

This subgenus is remarkable for the four posterior tibiæ, which are short, broad, arcuated, plane and slightly concave on their internal face, convex, and covered with granules or little spines on the opposite one, with the superior edge dentated, and the posterior teeth large and compressed; the trochanter of the two posterior thighs is very large.

The body is short, wide, convex above; the thorax transversal, rounded laterally, and its posterior margin sinuous; spurs of the anterior tibiæ very long, and the others almost laminiform.

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(1) Refer to this subgenus the *Scarites depressus*, and *Sc. marginatus*, Fab. and Oliv. See the Spec. Gen. des Coleop. I, p. 405: the Entomological Observations of Bonelli: and the work of Palisot de Beauvois on the Insects collected by him in America and Africa.

All the Pasimachi hitherto discovered are peculiar to *North* America. But four species are known, the *P. depressus*, *marginatus*, *sublævis*, and the *P. subsulcatus*, Say. *Am. Ed.*

The only species known—*Scarites ruficornis*, Fab.—inhabits the Cape of Good Hope.

SCARITES, Fab.

The four posterior tibiæ narrow, generally smooth, and merely furnished with little spines on their ridges, the intermediaries have at most one or two teeth on the exterior side; the trochanter of the posterior thighs much smaller than the thighs themselves. The mandibles form elongated triangles, and are strongly dentated at base. The second and third joints of the antennæ resemble reversed cones, almost of the same thickness; the following ones are granulous.

Some have two teeth on the exterior side of the intermediate tibiæ:

Sc. pyracmon, Bonel.; Dej., Spec. I, p. 367; *Sc. gigas*, Oliv., Col. III, No. 36, I, 1; Clairv., Entom. Helv. II, ix, a. About an inch long; apterous; flattened; of a shining black; the elytra somewhat widened posteriorly, finely striate, and the striæ lightly punctate; in the third, near the extremity, two more distinct and deeper puncta. The head, according to Count Dejean, is much larger in the male than in the female; the front of the latter presents two impressions and some little rugæ. The thorax, on each side, exhibits a tooth posteriorly. There are three on the anterior tibiæ. It is found on the borders of the Mediterranean, in the south of France, and the eastern part of Spain. M. Lefebvre de Cerisy, a distinguished naval officer and excellent entomologist, has published some observations on its habits.

Sc. terricola, Bonel.; Dej., Spec. I, p. 398. Body furnished with wings; from eight to nine lines in length; black; anterior tibiæ with three stout teeth, followed by three very small ones; external side of the two following tibiæ with but one; elytra elongated, striate, and slightly rugose; two deep points near the third stria. Found with the pyracmon.

Sc. sabulosus, Oliv., Col. III, 36, 1, 8; Clairv., Entom. Helv. II, ix, 6; *Scar. lævigatus*, Fab., Dej. Very similar to the terricola, but somewhat smaller and more depressed; it is apterous and the elytra slightly striate; but two indentations on the anterior tibiæ after the three ordinary teeth. It inhabits the same localities as the pyracmon, and is also found in Sicily(1).

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(1) The *Sc. subterraneus*, Fab. Syst. El. I, p. 124, No. 8, is usually considered as the only species of Scarites that inhabits the United States. The very great disparity of size, however, between it and a congener from Georgia, combined with

Oxygnathus, Dej.

The Oxygnathi, as to their antennæ and palpi, are essentially similar to the preceding Insects, but having, as well as the two following subgenera, long, narrow, edentated mandibles which cross each other in the manner of a forceps. Their body is narrow, elongated and cylindrical; their antennæ shorter than the head and mandibles united; the labrum rather indistinct, and the thorax almost square.

> The type of this subgenus—*Scarites elongatus*, Wiedem.; *Oxygnathus elongatus*, Dej. Spec. II, p. 474—is from the East Indies.

There, the four exterior palpi, or at least those of the labrum, terminate by a fusiform joint ending in a point. The body is elongated and cylindrical, and the mandibles are long, narrow, and without any remarkable teeth, like those of the Oxygnathi.

Oxystomus, Lat.

The labial palpi almost as long as the exterior ones of the maxillæ, recurved, the first joint salient and cylindrical, the second but slightly elongated, and the last fusiform, long and acutely pointed at the end; the antennæ completely moniliform from the middle of their length, with the first joint as long as the three following ones united(1).

Camptodontus, Dej.

The labial palpi evidently shorter than the external ones of the maxillæ, not recurved, and terminated as well as the latter by a fusiform joint; a greater part of the joints of the antennæ resembling inverted cones; the length of the first hardly surpassing that of the two following ones taken together(2).

The others, whose anterior tibiæ are not dentated externally, but simply didactyle at the end, have short mandibles, projecting but little beyond the labrum; the labrum coriaceous and entire; the ligula advancing beyond the emargination of the mentum, glabrous, or but slightly pilose, with separate, salient, and membranous para-

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a certain difference of aspect would seem to warrant the supposition that the latter is a distinct species. Although, after the most careful comparison of the two, I confess my inability to point out any truly specific difference, I am still inclined to believe they are distinct. *Am. Ed.*

(1) *Oxystomus cylindricus*, Dej. Spec. I, p. 410. Brazil.

(2) *Camptodontus cayennensis*, Ib., II, p. 477.

glossæ; the exterior palpi are terminated by an oval joint, acuminated at the extremity.

They are small, frequent humid places, and are not strangers in northern countries.

CLIVINA, Lat.

Three stout teeth on the external side of the two anterior tibiæ, and one on that of the next two(1).

DYSCHIRIUS, Bon.—*Clivina*, Dej.

Nothing but dentations or very indistinct and small spines on the external side of the two anterior tibiæ, and where the extremity of this side is usually extended into a long point in the form of a spine, and opposed to another consisting of a stout spur on the internal side. The last joint of the labial palpi is thicker in proportion than that of the Clivinæ, and almost clavato-securiform. The thorax is usually globular(2).

Our second and last subdivision of the Bipartiti will comprise those whose anterior tibiæ are neither dentated externally, nor bidigitated at the extremity, and where the second joint of the antennæ is evidently shorter than the third. They closely approximate to the two last subgenera in the organs of manducation, and have been confounded by some authors with the Scarites, which, in fact, they very much resemble, both in appearance and habits.

Some have a narrow elongated body, almost forming a parallelopiped, with a nearly square thorax; the antennæ either entirely or partly granose; the last joint of the exterior palpi almost cylindrical, and the same of those of the labium, nearly in the form of a reversed cone, or securiform. They are all exotic.

MORIO, Lat.

Antennæ equal in size throughout; labrum profoundly emarginate; exterior palpi filiform; thighs oval, with triangular tibiæ(3).

OZÆNA, Oliv.

Antennæ thicker or inflated at their extremity; labrum entire;

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(1) *Tenebrio fossor*, L.; *Scarites arenarius*, Fab.; Clairv. Entom. Helv., II, viii, A, a. The Clivinæ of Count Dejean, Spec. I, p. 411, 1—7.

(2) Clivinæ, 8—21, of Count Dejean; but the eighth, or the *arctica*, seems to present the characters of a Cephalotus.

(3) *Harpalus monilicornis*, Lat. Gener. Crust. et Insect. I, p. 206; *Morio monilicornis*, Dej. Spec. I, p. 430; *Scarites Georgiæ*, Palis. de Beauv., VII, xv, 5;—*Morio brasiliensis*, Dej. Ib.;—*Morio orientalis*, Id., Ib.

labial palpi terminating by a larger and almost securiform or triangular joint; thighs and tibiæ narrow and elongated(1).

The others have an oval or oblong body, and the thorax either nearly in the shape of a cup or heart, or almost orbicular; the antennæ are filiform, and consist mostly of cylindrical joints, the last particularly; the others narrowed at base and nearly in the form of a reversed cone; the last joint of the exterior palpi is almost oval or fusiform. The labrum is emarginate.

They are peculiar to the hot and sandy districts of the western countries of the eastern continent.

Ditomus, Bon.—*Carabus*, *Calosoma*, *Scaurus*, Fab.

Palpi shorter than the head; thorax cordiform, or like a cup; tarsi short.

Some species, those to which Ziegler has restored the generic appellation of *Ditomus*, have a more elongated body of equal width; the head separated from each side of the thorax by a re-entering angle, and usually armed, in the males, with one or two horns(2).

The others, or those which compose the genus *Aristus*, Zieg., have the body shorter, and wider before; the head almost continuous with the thorax, and buried in it up to the eyes; its anterior angles are pointed(3).

Apotomus, Hoff.—*Scarites*, Ross.

The anterior palpi very long; thorax orbicular; tarsi filiform and elongated; exterior maxillary palpi much longer than the head, and terminated by an ovoido-cylindrical joint; the same joint of those of the labium elongated and fusiform. I have not perceived a tooth in the emargination of the mentum(4).

3. Our third section of the Carabici, that of the Quadrimani,—

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(1) *Ozæna dentipes*, Oliv., Encyclop. Method.;—*Ozæna Rogerii*, Dej., Spec. p. 434;—*Ozæna brunnea*, Id., Ib.;—*Ozæna Gyllhenalii*, Id. Ib.

(2) Dejean, Spec. I, p. 439, first division of Ditomus. The *Carabus calydonius* of Fabricius, according to a label affixed by him to a specimen taken from the collection of M. Desfontaines, forms a species very distinct from the *Ditomus calydonius* of Dejean. The mandibles of the male are forked or divided as it were into two horns; the middle horn terminates in a point or rather is hastate at the extremity. The *Calosoma longicornis* of Fabricius is probably the female of this species or of another that is closely allied to it.

(3) Second division of Ditomus of Count Dejean, Ib., p. 444.

(4) *Scarites rufus*, Oliv., Col. III, 36, 11, 13, a, b; Rossi, Faun. Etrusc. I, iv, 3; *Apotomus rufus*, Dej., Spec. I, p. 450;—*Apotomus testaceus*, Id., Ib., p. 451.

[illegible] includes those, otherwise similar to the last in the [illegible] of the posterior extremity of their elytra, in the [illegible] the four anterior tarsi are dilated; the three or four [illegible] in the form of a reversed heart or triangular, and [illegible] by acute angles; they are usually furnished [illegible] the Ophoni excepted) with two ranges of papillæ or [illegible] an intermediate linear space.

[illegible] is always winged, and generally oval and arcuated or [illegible] above; the thorax is wider than it is long, or at most nearly [illegible]rical, square or trapezoidal. The head is never suddenly con[illegible] posteriorly, and the antennæ are equal throughout, or slightly and insensibly thickened near the extremity. The mandibles are never very strong. The exterior palpi are terminated by an oval or fusiform joint, longer than the preceding one. The tooth of the emargination of the mentum is always entire, and in some is wanting(2). The legs are robust, the tibiæ spiny, and the hooks of the tarsi simple. The intermediate tarsi, even in the females, are short, and, with the exception of the dilatation, nearly formed like the anterior. These Carabici prefer sandy and hot localities.

This section is composed of the genus *Harpalus*, as limited by Bonelli in his tabular view of the general distribution of the Carabici. New sections have still more diminished its extent. They are all subordinate to the three following divisions.

The characters of the first are: the emargination of the mentum unidentate(3); labrum emarginate; head and anterior extremity of the thorax as wide as the abdomen or wider(4). It comprises three subgenera.

Acinopus, Zieg. Dej.

Filiform antennæ, composed of short but cylindrical joints; thorax insensibly narrowed from before backwards, with the posterior

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(1) This appellation harmonizes with those of the two following sections, and is founded on an exclusive character: it therefore seems to me to be preferable to that of *Harpalici*, employed by Bonelli.

(2) The ligula, as in the two following sections, is always remarkably salient, obtuse or truncated at the end, and accompanied by two distinct, membranous paraglossæ in the form of auricles.

(3) If the Cyclosomi have the four anterior tarsi dilated, they will form a fourth division on account of the two teeth in the emargination of the mentum.

(4) The head large; paraglossæ rather broad in comparison with the true ligula, and rounded at the end; second joint of the antennæ somewhat shorter than the third; intermediate tarsi of the males rather less dilated than the anterior.

angles very obtuse or rounded; mandibles destitute of teeth; tooth of the emargination of the mentum widely truncated(1).

Daptus, Fisch.—*Acinopus*, Dej.

The antennæ, from the fifth joint, moniliform; thorax suddenly narrowed towards its posterior angles, which terminate in a point; one of the mandibles projecting and very pointed; the four anterior tibiæ, those of the males particularly, covered with very small spines(2).

Near Daptus should apparently be placed the genus *Pangus* of M. Megerle, mentioned by count Dejean in his catalogue.

In examining one of the two species (the *pensylvanicus*), referred by the latter to this genus, I could discover no character which should distinguish the section in question from the preceding one.

The second division consists of Harpali, in which the emargination of the ventum is also unidentate, but where the more or less oval or ovoid body is narrowed before, and the labrum entire, or simply somewhat concave. They form the

Harpalus, Dej.

Or the true Harpali. One of the most common in all Europe is

> *H. æneus; Carabus æneus*, Fab.; Panz. Faun. Insect. Germ. LXXV, 3, 4. Body about four lines in length, and of a shining black; antennæ and legs fulvous; thorax and elytra most commonly green, or cupreous and brilliant, sometimes of a bluish black. The thorax is transversal, narrowed posteriorly, and the lateral and posterior margins delicately reflected, with a punctated depression on each side near the posterior angles. The elytra are striated, with an incisure near the extremity, and little depressed puncta between the exterior striæ. This insect has also been called the *Proteus*, on account of the variety of its colours.(3)

The total absence of a tooth in the emargination of the mentum distinguishes the Carabici of the third and last division of this section, which, by the form of the body and the labrum, resemble those of the preceding division.

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(1) *Harpalus megacephalus*, Lat., Gener. Crust. et Insect. I, p. 206; *Carabus megacephalus*, Fab.; Ross. Faun. Etrusc., Append., tab. III, H; *Acinopus megacephalus*, Dej. Catal.

(2) *Acinopus maculipennis*, Dej.; *Dactus pictus*, Fisch., Entom. Russ. II, xxvi, 2, xlvi, 2; *D. vittatus*, Id., Ib., 7, var.? *Ditoma vittiger*, Germ.; *D. chloroticus*, Id. Ib.

(3) For the other species, see the Catalogue, &c. of Count Dejean, genus *Harpalus*, p. 14, and for their synonymes Schœnherr's Synonymia Insectorum, and the Faun. Aust. of Duftschmid. Fabricius has described but few of them, of which we will mention those he calls *caliginosus*, *ruficornis*, *binotatus*, *tardus*, *heros*, *analis*, *flavilabris*, &c. The *Carabus signatus*, and *hirtipes* of Panzer also constitute a part of this subgenus.

Ophonus, Zieg. Dej.

The four anterior tarsi of the males strongly dilated, or evidently wider, and generally furnished beneath with numerous and compact hairs, forming a continuous brush; the penultimate joint is not bilobate. The last joint of the exterior palpi truncated, or very obtuse.

The body is very finely punctated above, and the thorax most frequently cordiform, and truncated posteriorly(1).

Stenolophus, Zieg. Dej.

The Stenolophi only differ from the Ophoni in the form of the penultimate joint of the four anterior tarsi, at least in the males, and in some even of the posterior; it is divided down to the base into two lobes(2).

Acupalpus, Lat.—*Stenolophus*, Dej.

The four anterior tarsi of the males differing but little from the intermediate joints; rounder, almost granular, and pilose; exterior palpi terminating by a joint with a pointed extremity.

They are very small insects, and seem to be allied to Trechus(3).

4. The fourth section, that of the Simplicimani(4), approaches the

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(1) See Catalogue, &c., Dejean, p. 13.

(2) *Stenolophus vaporariorum*, Dej. Ib.; *Carabus vaporariorum*, L.; Panz., Faun. Insect. Germ., XVI, 7; *Harpalus saponarius*, Dufour. Senegal.

(3) The Stenolophi of the Catalogue, Dej., the preceding one excepted. We will name, among others, the *Carabus meridianus*, Lin. and Fab., and the *C. vespertinus* of Panzer, XXXVII, 21.

(4) This section, in the system of Dejean, forms his tribe of *Carabiques Feroniens*, in which—Spec. Gen. des Coleop. III—he has established several new genera. Those male Feroniæ, in which the two first joints of the two anterior tarsi are alone dilated, are comprised in the genera Pogonus, Cardiaderus, Baripus, and Patrobus. In the two first, the last joint of the labial palpi is oval or pointed, whilst in the other two it is almost cylindrical, truncated at the extremity, and slightly securiform. The second—*Daptus chloroticus*, Fischer—differs from the first in the thorax which is convex, cordiform, and narrowed posteriorly. In *Baripus*, it is convex and almost oval. That of *Patrobus* is plane, narrowed posteriorly and more or less cordiform.

In the other male Feroniæ the three first joints of the anterior tarsi are dilated. A first subdivision comprehends those Feroniæ the hooks of whose tarsi are dentated, and among these the genus Dolichus is the one in which the tooth of the middle of the emargination is simple, that is to say, entire. That which he names preceding in the manner in which the elytra are terminated; but the two anterior tarsi alone are dilated in the males, without however forming a square or orbicular palette; sometimes the three first

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PRISTONYCHUS, is identical with my *Ctenipus:* to this he refers the *Sphodrus terricola* of his Catalogue. His new genus PRISTODACTYLA closely resembles *Taphria*, but the last joint of the palpi is elongated and almost cylindrical, and the thorax is oval. He describes but a single species.

Among the Feroniæ in which the hooks of the tarsi are simple, four genera, OMPHREUS, OLISTHOPUS, MASOREUS, and ANTARCTIA, are removed from all the others by the absence of a tooth or lobe in the middle of the emargination of the mentum. The first, of which Count Dejean has only seen the females, is very distinct by the length of the first joint of the antennæ which equals that of the three following ones; and then by its palpi the last joint of which is strongly securiform. That naturalist places this genus directly after Sphodrus; perhaps it may come among the Patellimani, and approximate to Rembus and Dicælus. The second genus, OLISTHOPUS, belongs to that division in which the three first joints of the anterior tarsi of the males are elongated, and very slightly triangular or almost square—its type is the *Agonum rotundatum* of Sturm. The other two re-enter the division of those in which the three first joints of the two anterior tarsi of the males are but slightly elongated; they are as long as they are wide and strongly triangular or cordiform. The thorax in *Masoreus* is transversal, rounded laterally, and slightly prolonged in the middle. That of *Antarctia* is more or less square or cordiform, and slightly or not all transversal. The *Harpalus circumfusus* of Germar, referred by us to TETRAGONODERUS, is an Antarctia.

Six other genera, TRIGONOTOMA, CATADROMUS, LESTICUS, DISTRIGUS, ABACETUS, and MICROCEPHALUS, form, among the Feroniæ with tarsi analogous to those of the last, a small section, the character of which consists in a trilobate or slightly emarginated mentum[*]. The last genus, that of *Microcephalus*, is very distinct from the others on account of its exterior palpi, all of which are terminated by a securiform joint. The first is similarly distinguished, inasmuch as the termination of the labial palpi of the males is the same. The *Omaseus viridicollis* of Mac Leay—Annul. Javan.—is congeneric. In the genera *Catadromus* and *Lesticus*, the last joint of the same palpi is, however, slightly securiform, or becomes gradually thickened towards the extremity. The intermediate lobe of the mentum projects and almost in a point in the first, and is but slightly elongated and almost truncated in the second, which, like the preceding, consists of Insects proper to India. The last joint of the labial palpi in *Distrigus* and *Abacetus*, is almost cylindrical. The intermediate lobe of the emargination of the mentum is almost null in the former; in the latter it is very apparent and rounded. These Carabici are, as yet, foreign to Europe and America.

The *Scarite hottentot* of Olivier, which we have placed in the subgenus Feronia, is removed from the species that formed the genus *Steropus*, by its intermediate tibiæ which are strongly arcuated. It is from this character that Count Dejean has joints are much wider, and in this case the succeeding one is always smaller than its antecedent; sometimes the latter and the two preceding ones are larger, almost equal, and in the form of a reversed heart or triangular: the first joints of the four following tarsi are more slender and elongated, almost cylindrical, or in the form of an elongated and reversed cone.

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[*] The ordinary tooth in the middle of the mentum is very large, and thus forms a lobe which diminishes the extent of the emargination.

In some, the hooks of the tarsi are simple or not dentated.

Here the third joint of the antennæ is, at most, double the length of the preceding one. The feet are generally robust, the thighs thick and more or less oval; the thorax measured in its greatest transversal diameter is as wide as the elytra.

Sometimes the mandibles are evidently shorter than the head, not projecting beyond the labrum at most more than half their length.

We will begin with those in which the exterior palpi are filiform.

ZABRUS, Clairv. Bon.—*Pelor*, Bon.

Distinguished from the following by the last joint of the maxillary palpi, which is evidently shorter than the preceding one, and by the two spines which terminate the two anterior tibiæ(1).

POGONUS, Zieg. Dej.

The Pogoni, which in a natural order appear to us to be closely allied to the *Amaræ* of Bonelli, are removed from the other Carabici of this division by the mode of dilatation peculiar to the two anterior tarsi of the males; the two first joints, of which the radical is the largest, are alone dilated; the two following ones are small and equal. Their body is usually more oblong than that of an Amara,

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separated this insect from the Feroniæ, and formed the genus CAMPTOSCELIS. The last joint of the exterior palpi being strongly securiform in MYAS, that genus should also be distinguished from the Feroniæ.

Count Dejean has observed that in the genus PELOR, of Bonelli, the tooth of the middle of the emargination of the mentum is bifid, while it is entire in Zabrus. He retains, as we have already stated, his genus *Amara*, but if the characters assigned to it be compared with those of the Feroniæ, the slightness of this generic distinction will soon be perceived. The last joint of the palpi of the Amaræ is slightly oval; it is cylindrical or slightly securiform in the Feroniæ. His genus *Tetragonoderus* differs but very little from that of Amara. The tooth in the middle of the emargination of the mentum is truncated and entire, or without a fissure.

(1) *Carabus gibbus*, Fab.; *Labrus gibbus*, Clairv., Entom. Helv., II, xi. For the other species see Catalogue, &c. of Dejean; and the third volume of his Species, Gener., &c. The apterous species, such as the *Blaps spinipes*, Fab.; Panz. Faun. Insect. German., XCVI, 2, form the genus *Pelor*.

besides which they appear to inhabit, exclusively, the coast or borders of salt-water ponds(1).

It is only by an analogous character that we can distinguish from the last the

TETRAGONODERUS, Dej.

Anterior tarsi of the males less dilated, in proportion, than in the following ones, their first joints being more narrow, elongated, and rather in the form of a reversed cone than cordiform. These Insects are peculiar to South America(2).

FERONIA, Lat.

Three first joints of the anterior tarsi of the males strongly dilated, in the form of a reversed heart; second and third rather transversal than longitudinal.

This subgenus will include the numerous generic sections given in the Catalogue, &c. of Count Dejean, such as *Amara*, *Pœcilus*, *Argutor*, *Omaseus*, *Platysma*, *Pterostichus*, *Abax*, *Steropus*, *Percus*, *Molops*, *Cophosus*. This learned entomologist has since—Species III—perceived the impossibility of distinguishing them, the first excepted, which he still retains; the others he unites in one great generic section which he calls, with me, *Feronia*. But even as regards the Amaræ themselves, I have vainly sought for characters in the antennæ and parts of the mouth, which might clearly distinguish them from the other genera. The one drawn from the tooth of the middle of the emargination of the mentum, to say nothing of the slight degree of importance attached to it, is very equivocal; this tooth in all these Carabici appears to me to be emarginated at the extremity, though somewhat more deeply or distinctly in some than in others. The antennæ of several are slightly granose, or composed of joints comparatively shorter, and rounded at the summit; but the limits of this distinction cannot be rigorously defined. I say the same of the concavity of the anterior margin of the labrum and of the form of the thorax.

The Feroniæ may form three divisions:

1. Those species, generally furnished with wings, in which the more or less oval body is slightly convex or arcuated above, with more filiform antennæ, the head proportionably narrower, and the

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(1) See the Catalogue of Dejean. Germar in the Fauna Insectorum Europæ has figured two species: *Pogonus halophilus*, X, i; *Harpalus luridipennis*, VIII, 2, allied to the *Pogonus pallidipennis* of the first.

(2) *Harpalus circumfusus*, Germ. Insect. Spec. Nov. I, 26?

mandibles somewhat less salient. In their habits these species approach the Zabri and Harpali. Such are the Amaræ(1), whose thorax is transversal; the Pœcili, where it is almost as long as it is wide, and where the third joint of the rather short antennæ is compressed and angular; and the Argutores similar to the Pœcili, but whose antennæ are proportionably longer, and their third joint not angular.

2. The species usually furnished with wings, but in which the body is straight, plane or horizontal above, with a nearly equally wide head. They frequent cool or damp places. Such is the genus *Platysma*, Bonelli, with which we unite that of *Omaseus*, Zieg., and Dej., and the *Catadromus* of Mac Leay, Jun.(2)

3. The third division of the Feroniæ will consist of species analogous to those of the preceding one in the ensemble of their characters, but differing from them by the absence of wings.

Of these, some, the most numerous, and in which the thorax is not always in the form of a truncated heart, have a well marked, continuous, transverse fold or border at the base of the elytra, that extends to the suture.

Sometimes the thorax is almost square, or has the form of a truncated heart, with acute posterior angles.

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(1) Shorter species, whose thorax widens from before posteriorly, constitute the genus *Leirus* of some authors. The *Scolytus flexuosus*, Fab., seems referable to this division, but according to count Dejean the four anterior tarsi are dilated: it appeared to me that they were most so externally. This Insect may form a separate subgenus—*Cyclosomus*. As to the preceding ones, see the Species, Gener. des Coleop. Dej., III.

(2) Those in which the body is much flattened, and the thorax considerably narrowed posteriorly in the form of a truncated heart, will constitute a first division: such is the *Carabus picimanus*, Duft., or the *C. monticola* of others; Count Dejean places it in *Pterostichus*; certain Brazilian species also belong to it. M. Germar—Insect. Nov. Spec. I, p. 21—describes one of them under the name of *Molops corinthius*.

Those, in which the body nearly forms a parallelopiped, and the thorax is almost square, but slightly or not at all narrowed posteriorly, will constitute a second division. Of this number are the *Platysma nigra*, Bonel., and Dej., the *Omasei* of the latter—Catal. p. 12—and the *Carabus tenebrioides* of Olivier, the type of the subgenus *Catadromus* of Mac Leay, Jun.—Annul. Javan. I, p. 18, 1, 5—which only differs from *Omaseus* in the tooth of the mentum, which is much larger and entire; the elytra have a large sinus, or rather an emargination at their extremity. It is one of the largest species of this family.

The *Harpalus nigrita*, *anthracinus*, and *aterrimus*, of Gyllenhall, are *Omasei*. The last has the posterior angles of the thorax obtuse, a circumstance which distinguishes it from all the others. The *Carabus leucopthalmus*, Fab. or the *melanarius* of Illiger is placed in the same division, but it is apterous.

Those, in which the body forms a long or cylindrical square, where the thorax is almost square, hardly narrower behind than before, form the genus *Cophosus* of Ziegler and Dejean. It was established on an Austrian species, the *C. cylindricus*(1).

Those in which the body is generally oval, depressed, or but slightly concave above, with a wide, nearly square, and subisometrical thorax, whose lateral margin is always strongly reflected, and is as wide, or nearly as wide, at its posterior margin as the base of the elytra, compose the genus *Abax* of Bonelli.

Several species are found in Germany. The one called the *metallicus*, and the *Molops striolatus*, Dej. whose antennæ are composed of shorter joints, or are nearly granose, have been formed into a new genus, styled *Cheporus*(2).

The *F. striola; Carabus striola*, Fab.; *Carabus depressus*, Oliv., Col. III, 35; IV, 46, is often found in the cold or humid localities of the forests in the environs of Paris(3).

Sometimes the thorax, always terminated posteriorly by two well marked or acute angles, is evidently narrowed behind. Its figure approaches more or less to that of a truncated heart.

Of these species, several have the body depressed or plane above, and the antennæ composed of elongated joints, rather obconical than turbinated. They are distinguished generally by Bonelli under the genuine name of *Pterostichus*. They more particularly inhabit the high mountains of Europe, and Caucasus.

But a single species—*Carabus oblongo-punctatus*, Fab.; Panz., Faun. Insect. Germ., LXXIII, 2—is found in the environs of Paris(4).

Others, whose antennæ are almost granose, have the body convex above, and proportionably wider, with a shorter abdomen. They form the genus *Molops*, Bonelli, which evidently leads to other very analogous Feroniæ, but where the posterior angles of the thorax are rounded, and the abdomen oval, the exterior angle of the base of the elytra being obtuse or non-salient. The body and antennæ are, in general, proportionably longer. These latter species have been separated from Pterostichus to form a new genus, the *Steropus*, Meg.(1)

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(1) We will add to it the *Omaseus melanarius*, Dej., as well as another species of Germany intermediate between the preceding ones and the *Cophosus cylindricus*, and which, I think, is the *Omaseus elongatus*, Ziegler.

(2) The Platysmæ described and figured by M. Fischer—Entom. Russ., II, xix, 4, 5;—are probably analogous Abaces.

(3) For the other species, see the Catalogue of Count Dejean, and the Faun. Aust. of Duftschmid.

(4) For the other species see Dejean's Catalogue and the Entom. Russ., Fischer, II, p. 123, xix, f. 1; xxxvii, 8, 9. I coincide with the opinion of the latter, that the *G. myosodus*, Meg., does not essentially differ from *Pterostichus*.

Finally, we will terminate this subgenus with species, generally large, in which the thorax, almost always, has the form of a truncated heart, and the base of whose elytra has no transverse fold, presenting almost a smooth space without any well terminated posterior edge. Such appears to me to be the most distinguishing character of the genus *Percus*, Bonelli. Neither the relative length of the two last joints of the maxillary palpi, the inequality in the proportions of the mandibles, nor some slight sexual difference taken from the latter annuli of the abdomen, clearly distinguish it from the other subgenera. These species are exclusively confined to Spain, Italy, and the great islands of the Mediterranean. Some of them are flattened above(2).

MYAS, Zieg.

These Insects resemble the Feroniæ which constitute the genus *Cheporus*, but their thorax is more dilated laterally, and narrowed near its posterior angles, immediately before which is a little emargination. The labial palpi terminate in an evidently thicker and nearly triangular joint.

Two species are known, one from Hungary, the *M. chalybæus*, and the other from North America, where it was discovered by Major Le Conte(3). [The *M. cyanescens*, Dej.—*Am. Ed.*]

Sometimes the mandibles are as long as the head, and extend considerably beyond the clypeus. The body is always oblong, and the thorax in the form of an elongated heart. Some of them resemble Scaritides and others Lebiæ.

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(1) See Dejean's Catalogue, and the Insect. Spec. Nov., Germar, I, p. 26, et seq. Some species, such as the *Molops terricola* (*Scarites gagates*, Id. XI, i) and the *Steropus hottentotus* (*Scarites hottentotus*, Oliv., Col. III, 36, 11, 19) were formerly placed among the *Scarites*. The *Carabus madidus*, Fab.; Faun. Insect., Eur., V, 2, a common species in some of the southern departments of France is a Steropus. Count Dejean forms a new genus with the *St. hottentotus* on account of the anterior legs, the tibiæ of which are arcuated, and of some other characters.

(2) *Carabus Paykulii*, Ross., Faun. Etrusc., I, tab. V, f. C,—*Percus ebenus*, Charp. Hor. Entom, V, i. See also the Ann. des Sc. Nat. and Ann. des Sc. Phys., of MM. Bory de Saint-Vincent, Drapiez and Van-Mons. I refer the *Abax corsicus*, Dej., to the same subgenus.

(3) Other species, analogous in the form of their labial palpi, but with stouter mandibles, in which the tooth of the mentum is much larger, and peculiar to the East Indies, form the genus *Trigonomota* of Count Dejean, the characters of which are given in the third volume of his Species des Coléoptères. Here also should be placed the genus *Pseudomorpha* of Kirby, Lin. Trans. XIV, 98.

CEPHALOTES, Bon.—*Broscus*, Panz.

Length of the antennæ almost equal to half that of the body; their joints short, the first shorter than the two following ones taken together; the right mandible strongly unidentated on the internal side; labrum entire(1).

STOMIS, Clairv.

The antennæ longer than the half of the body, and composed of elongated joints, the first of which is longer than the two following ones taken together; the middle of the internal side of the right mandible deeply notched; the labrum emarginate(2). The following subgenus

CATASCOPUS, Kirby,

Is distinguished from the two preceding subgenera, to which it otherwise approximates in the relative length of the third joint of the antennæ, by the flatness of the body, by being proportionably wider, with a shorter thorax, by the elytra being strongly emarginate laterally at their posterior extremity, and by the elongation of the labrum. The eyes are large and protuberant. These are ornamented with brilliant colours, and at the first glance resemble Cicindelæ or Elaphri(3).

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(1) *Carabus cephalotes*, Fab.; Panz., Faun. Insect. Germ., LXXXIII, 1; Entom. Ind., p. 62.

(2) *Stomis pumicatus*, Clairv. Entom. Helv. II, vi.

(3) This subgenus was established by M. Kirby on one of the Carabici (*Catascopus Hardwickii*, Trans. Lin. Soc. XIV, iii, 1; Hist. Nat. des Coleop. d'Eur. II, vii, 8) of the East Indies, which has a green head and thorax, the elytra of a greenish-blue with punctuated striæ, and the under part of the body almost blackish. M. Mac Leay, Jun.—Annul. Javan. I, p. 14—places the Catascopi in his family of the Harpalides, directly after the Chlænii, and refers to it the *C. elegans*, Fab., which M. Weber arranges with the Elaphri. He distinguishes them from another neighbouring subgenus, which he establishes under the name of *Pericalus*, by the antennæ, the second and third joints of which are nearly equal in length, whilst here the third is the longest; by the mandibles which are short, thick, and curved, instead of being directed forwards and nearly parallel; by the palpi which are short, thick, with the last joint ovoid and almost truncated, whilst those of the Pericali are slender and cylindrical; and finally by the head, which is wider than the thorax, a circumstance that does not occur in the Catascopi. Besides this, the eyes of the Pericali are very globular and protuberant, giving them some resemblance to the Elaphri and Cicindelæ. He describes but one species—

There, the length of the third joint of the antennæ is triple, or nearly so, of that of the preceding one. These organs, as well as the legs, are generally slender.

In these, the four first joints of the anterior tarsi of the males are wide, and the penultimate is bilobate.

Colpodes, Mac Leay.

This subgenus established by M. Mac Leay, Jun.—Annul. Javan., I, p. 17, pl. i, f. 3—appears to be allied in many points to Catascopus and the following subgenera. According to him, the labrum is a transverse square, and entire, the emargination of the mentum simple or edentate, and the head almost the length of the thorax. The latter is nearly in the form of a truncated cone, emarginate before, with rounded and slightly bordered sides. The elytra are slightly emarginate. The lobes of the penultimate joint of the anterior tarsi of the male are the largest. The body is somewhat convex. He quotes but a single species, the *brunneus*.

In those, all the joints of the tarsi, in both sexes, are entire.

Mormolyce, Hagemb.

The body strongly flattened, foliaceous, and its anterior half much the narrowest; head very long, narrow, and almost cylindrical; thorax oval and truncated at both ends; elytra greatly dilated, and arcuated exteriorly,—their internal side, near the extremity, profoundly emarginate.

The only species known—*phyllodes*—is found in Java, and forms the subject of a Monograph published by M. Hagembach.

Sphodrus, Clair. Bon.—*Lœmosthenus*, Bon.—*Carabus*, Lin.

The body depressed but not foliaceous; head ovoid; thorax cordiform; elytra without any exterior dilatation or internal emargination.

Several of these Insects live in cellars(1).

Pericalus cicindeloides, 1, 2; we are still, however, ignorant of their sexual difference, particularly as respects the tarsi. The form of the ligula of the Catascopi and that of their tibiæ remove them from Elaphrus and Tachys. These insects approximate most nearly to the Chlænii, Anchomeni, Sphodri, &c. Several of the Simplicimani have the extremity of their elytra strongly sinuous, and in this respect are hardly distinguished from the *Truncatipennes*.

(1) *Carabus leucopthalmus*, L.; *Carabus planus*, Fab.; Panz. Faun. Insect Germ. XI, 4. In the *Sphodrus terricola*—*Carabus terricola*, Payk.; Oliv., Col. III, XXXV, ii, 124—the hooks of the tarsi present some small dentations, as in the following subgenus.

The last of the Simplicimani are distinguished from all the others by the internal dentations of the terminal hooks of their tarsi.

All the exterior palpi, of some, are filiform; their thorax is either in the form of a heart, narrowed and truncated posteriorly, or in that of a trapezium widening from before backwards.

Ctenipus, Lat.(1)—*Læmosthenus*, Bon.

The body straight and elongated, thorax cordiform, narrowed and truncated posteriorly; third joint of the antennæ elongated(2).

Calathus, Bon.

The body oval and arcuated above; thorax square or trapezoidal, wider posteriorly(3).

The labial palpi of the others have a clavate termination, in the form of a top or reversed cone, and a nearly orbicular thorax.

Taphria, Bon.—*Synuchus*, Gyll.

Emargination of the mentum bidentate, as in the preceding subgenera(4).

5. The fifth section, that of the Patellimani, is only distinguished from the fourth, by the manner in which the two anterior tarsi of the males are dilated; the first joints—usually the three first, then the fourth, and sometimes only the two first—all of which are sometimes square, and at others only in part, the remainder being cordiform, or resembling a reversed triangle, but always rounded at their extremity, and not terminated as in the preceding sections by acute angles, form an orbicular palette or long square, the inferior surface of which is usually furnished with brushes or crowded papillæ, without any intermediate vacancy.

The legs are generally slender and elongated, and the thorax is frequently narrower than the abdomen, throughout its whole length.

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(1) Formerly Ctenipus, Lat., who recommends the substitution of the above name for his own, as we have already the genus *Ctenopus*. *Am. Ed.*

(2) The Sphodri *janthinus*, *complanatus*, and several others of count Dejean, which are distinguished from the true Sphodri by the abbreviation of the third joint of the antennæ, and by the dentations of the hooks of the tarsi. These two subgenera are almost insensibly confounded with each other. M. Fischer has figured several species of both under the generic appellation of Sphodrus in his Entom. Russ. Vol. II.

(3) *Carabus melanocephalus*, Fab.; Panz., Faun. Insect. Germ. XXX, 19;—*C. cisteloides*, Ib., XI, 12;—*C. fuscus*, Fab.;—*C. frigidus*, Id. See the Catalogue, &c. Dej., and the Insect. Spec. Nov., Germar, I, p. 13.

(4) *Carabus rivalis*, Illig.; Panz. Ib. XXXVII, 19.

Most of them frequent the shores of rivers, or other aquatic localities.

We divide the Patellimani into those in which the head becomes insensibly narrowed behind, or at base, and those where this contraction occurs suddenly behind the eyes in such a manner that the head seems to be supported by a kind of neck or pedicle.

The first also may be subdivided into two.

Some, in which the mandibles always terminate in a point, and the palette of whose tarsi is always narrow, elongated, and formed by the three first joints, the second and third square, have the labrum entire or nearly unemarginate, and one or two teeth in the emargination of the mentum; the anterior extremity of the head has no border.

Here, as in the preceding ones, the under part of the palettes of the tarsi present two longitudinal series of papillæ or hairs, with an intermediate space, and not a compact and continuous brush. The exterior palpi are always filiform and terminated by an almost cylindrical or ovoido-cylindrical joint.

Sometimes the body is strongly flattened.

Dolichus, Bon.

The Dolichi approach the last subgenera, and are removed from all the others by the hooks of their tarsi, which are dentated beneath. Their thorax is cordiform and truncated(1).

Platynus, Bon.

Similar to Dolichus in the form of the thorax, but the tarsial crotchets are simple.

The wings are absent in some, or are imperfect(2).

Agonum, Bon.

Where the thorax is almost orbicular(3).

Sometimes the body is of an ordinary thickness, the thorax being always in the form of a truncated heart.

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(1) *Carabus flavicornis*, Fab.; Preysl., Bohem. Insect., I, iii, 6, and some other species of the Cape of Good Hope.

(2) *Platynus complanatus*, Bon.;—*Carabus angusticollis*, Fab.; Panz. Faun. Insect. Germ., LXXIII, 9;—*Platynus blandus*, Germ., Insect. Spec. Nov., I, p. 12;—*Carabus scrobiculatus*, Fab.;—*Harpalus livens*, Gyll.

American species; *Plat. erythropus*, Dej.;—*P. angustatus*, Id. Species III, p. 97—99. *Am. Ed.*

(3) *Harpalus viduus*, Gyll.; Panz., Ib., XXXVII, 18;—*Carabus marginatus*, Fab.; Panz., Ib. XXX, 14;—*Carab. 6-punctatus*, Fab.; Panz. Ib. XXX, 13, and

Anchomenus, Bon.(1)

There, the inferior surface of the tarsial palette is furnished with a compact and continuous brush. The exterior palpi, those of the labium in particular, are terminated in several by a thicker or wider joint in the form of a reversed triangle.

We will commence with those in which they are filiform.

Callistus, Bon.

The tooth in the emargination of the mentum entire; exterior palpi terminated by an oval joint pointed at the end; thorax in the form of a truncated heart(2).

Oodes, Bon.

Similar to Callistus in the tooth of the emargination of the mentum, but the last joint of the external maxillary palpi is cylindrical, while that of those attached to the labium forms a truncated oval. The thorax is trapezoidal, narrower before, and as wide posteriorly as the base of the abdomen(3).

Chlænius, Bon.

Tooth of the emargination of the mentum bifid; exterior maxillary palpi terminated by an almost cylindrical joint, somewhat

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XXXVIII, 17?—*C. parum-punctatus*, Fab.; Panz., Ib. XCII, 4;—*C. 4-punctatus*, Fab.; Oliv., Col. III, 35, xiii, 158. See Catalogue, Dej., who has formed a new genus of the *A. rotundatum*, and some others.

The genus, here alluded to by our author, is the Olisthopus, Dej., who, while he seems strongly inclined to form but one section of Agonum and Anchomenus, from the occasional, almost total, obliteration of the distinguishing characters of each, so that in some cases it is hardly possible to say whether an Insect should be referred to the first or the second, has deemed it necessary to separate the above species, which differ from Agonum in several essential characters, and principally in the absence of the tooth of the middle of the emargination of the mentum. See his Species, &c., III, p. 176, and add of American species of Agonum the *A. octopunctatum* (*Feronia octopunctata*, Say), *cupripenne*, *nitidulum*, *morosum*, *femoratum*, *melanarium*, &c., &c. *Am. Ed.*

(1) *Carabus prasinus*, Fab.; Panz., Ib., XVI, 6;—*C. albipes*, Fab.; Panz., Ib. LXXIII, 7;—*C. oblongus*, Fab.; Panz., Ib. XXXIV, 3. [Add for American species, the Anch., *gagates*, *sinuatus*, *corvinus*, *elongatulus*, *extensicollis*, *thoracicus*, &c., &c. *Am. Ed.*]

(2) *Carabus luneatus*, Fab.; Panz. Faun. Insect. Germ. XVI, 5; Dej. Spec. II, p. 296.

(3) *Carabus helopioides*, Fab.; Panz., Ib., XXX, ii. See Dej. Spec. II, p. 374.

smaller at base; last joint of the labial palpi in the form of a reversed and elongated cone.

The *Carabe savonnier* of Olivier, Col. III, 38, iii, 26, which is used in Senegal in lieu of soap, belongs to this subgenus(1).

In the following, the exterior palpi are terminated by a wider, compressed joint, in the form of a reversed triangle or securiform, and more dilated in the males. The tooth of the emargination of the mentum is always bifid.

EPOMIS, Bon.

To which we will unite the *Dinodes*, in which the last joint of the palpi is somewhat more dilated(2).

The genus *Lissauchenus* of Mac Leay, Jun.—Annul. Javan., I, i, 1—appears to me to differ but slightly from the preceding.

The others, most commonly, have their mandibles very obtuse, or as if truncated and forked, or bidentated at the extremity. Their labrum is distinctly emarginate or bilobate, and the anterior portion of the head from which it arises, is bordered and frequently concave. There is no tooth in the emargination of the mentum. The tarsial palette of several is broad and almost orbicular.

The mandibles of these latter terminate in a point without any tooth or emargination under it.

The tarsial palette of the males is composed of the three first joints.

REMBUS, Lat.

The labrum bilobate; exterior maxillary palpi filiform; last joint of the labial palpi somewhat enlarged, and in the form of a reversed and elongated cone.

The head, in comparison with the width of the body, is narrow; the antennæ and palpi are slender(3).

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(1) *C. cinctus*, Fab.; Herbst. Archiv., XXIX, 7;—*C. festivus*, Fab.; Panz. Ib., XXX, 15;—*C. spoliatus*, Fab.; Panz. Ib. XXXI, 6;—*Chlænius velutinus*, Dej.; *Carabus cinctus*, Oliv., Col. III, 35, iii, 28;—*C. holosericeus*, Fab.; Panz., Ib., XI, 9, a;—*C. nigricornis*, Fab.; Panz., Ib., XI, 9, b. c;—*C. agrorum*, Oliv., Ib., XII, 144;—*C. 4-sulcatus*, Payk., and several other exotic species of Fabricius, such as the *tenuicollis*, *oculatus*, *posticus*, *micans*, *quadricolor*, *stigma*, *ammon*, *carnifex*, &c. See the Spec. Dej. II, p. 297, et seq. [Add of American species the *C. rufilabris*, *laticollis*, *rufipes*, *cobaltinus*, *nemoralis*, *tricolor*, &c., &c. *Am. Ed.*]

(2) *Dinodes rufipes*, Bon.; Dej. Spec. II, p. 372; *Carabus azureus*, Duft.; *Chlænius azureus*, Sturm., V, cxxvii;—*Epomis circumscriptus*, Dej., Spec. II, p. 369; *Carabus cinctus*, Ross., Faun. Etrusc., I, iv, 9;—*Carabus crœsus*, Fab.

(3) *Rembus politus*, Fab.; Herbst., Archiv. XXIX, 2;—*R. impressus*, Dej.; *Carab. impressus*, Fab.

Dicælus, Bon.

The labrum simply emarginate with an impressed longitudinal line in the middle; the last joint of the exterior palpi is the largest and almost securiform.

The body nearly forms a parallelopiped; the head is almost as wide as the thorax, and the elytra are strongly striated and frequently carinated laterally. The mandibles are arcuated inferiorly on the internal margin, and then as if truncated and terminated in a point. The species known are from America(1).

Those have very obtuse mandibles, emarginate at their extremity, or unidentate beneath.

Licinus, Lat.

The last joint of the exterior palpi largest and almost securiform; tarsial palette of the males broad, suborbicular, and formed by the two first joints, the first of which is very large(2).

Badister, Clair.—*Amblychus*, Gyll.

Last joint of the exterior palpi oval; that of the labial palpi merely somewhat thicker, and frequently terminating in a sharp point; tarsial palette forming a long square, and composed of the three first joints(3).

The last of the Patellimani, or those which constitute the second general division, have their head suddenly narrowed behind the eyes, and as if distinguished from the thorax by a sort of neck or pedicle. It is frequently small, with very protuberant eyes. In several, the ligula is short and projects but little beyond the emargination of the mentum.

Here, the emargination is edentate; the mandibles are tolerably stout, and the labrum is strongly emarginate and almost bilobate. Such is the

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(1) See Dej. Spec. II, 283. [They are the *Dic. chalybæus, alternans, furvus* (*D. elongatus*, Say), *simplex* and *politus*—all, I believe, that have as yet been ascertained. *Am. Ed.*]

(2) *Carabus agricola*, Oliv., Col. III, 35, V, 53;—*C. silphoides*, Fab.; Sturm, III, lxxiv, a;—*C. emarginatus*, Oliv., Ib., XIII, 150—*Carabus cassideus*, Fab.;—*C. depressus*, Payk.; Sturm, Ib, LXXIV, o, O;—*C. Hoffmanseggii*, Panz., Faun. Insect. Germ., LXXXIX, 5. See Spec. Dej. II, p. 405—411.

(3) *Carabus bipustulatus*, Fab.; Clairv., Entom. Helv. II, xiii;—*C. peltatus*, Illig.; Panz. Ib. XXXVII, 20. See Spec., Dej., II, p. 405—411.

PELECIUM, Kirby.

Last joint of the exterior palpi securiform; ligula short; body oblong, narrowest before; the four first joints of the anterior tarsi of the males in the form of a reversed triangle, furnished with brushes beneath; the fourth is bifid.

The species of this and the following subgenus are peculiar to South America(1).

There, the emargination of the mentum presents a tooth; the mandibles are usually small and moderate in the others. The labrum is entire or but slightly emarginate.

Some of them approach Pelecium in their exterior palpi, which are also terminated by a larger securiform joint, or one in the form of a reversed triangle. Their head is always small, and the thorax orbicular or trapezoidal.

CYNTHIA, Lat.—olim *Microcephalus*, Id.

The first joints of the anterior tarsi of the males in the form of a reversed triangle and forming the palette: they are provided with a brush underneath, and the fourth is bifid.

The head and the mandibles are stouter in proportion than in the ensuing subgenus. The exterior palpi are less elongated but more compressed at the end. The body is oval, with a trapezoidal thorax wider posteriorly, plane, bordered, and sulcated longitudinally(2).

PANAGÆUS, Lat.

The palette of the tarsi peculiar to the males formed of the two first joints only. The head is very small compared to the body, and the eyes globular. The mandibles, maxillæ and ligula are also very small. The thorax is most generally suborbicular(3).

In the following subgenera, which terminate this section, the exterior palpi are filiform; the last joint of the maxillary palpi is almost cylindrical, and that of those attached to the labium, oval or almost like a reversed and elongated cone. The first subgenus, the

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(1) *Pelecium cyanipes*, Kirby, Lin. Trans. XII, xxi, 1.

(2) A subgenus founded on certain species from Brazil which have the appearance of the *Abax*, Bonelli.

(3) *Carabus crux-major*, Fab.; Clairv., Entom. Helv. II, xv;—*Carabus notulatus*, Fab.,—*Cychrus reflexus*, Fab.; Oliv., Col. III, 35, viii, 77;—*Carabus angulatus*, Fab.; Oliv., Ib., vii, 76;—*Panagée à quatre taches*, Cuv., Reg. Anim. IV, xiv, 1. See the article *Panagée*, Encyc. Method., and the Species, Dej., II, p. 283, et seq.

LORICERA, Lat.,

Is very remarkable. The antennæ are setaceous and curved, with the second and four following joints shorter than the last, and furnished with fasciculi of hairs. The mandibles are small. The maxillæ are bearded externally. The labial palpi are longer than those of the maxillæ. The eyes are very prominent. The thorax is nearly orbicular or cordiform, and widely truncated, with its posterior angles rounded. The three first joints of the anterior tarsi are dilated in the males(1).

PATROBUS, Meg.

The antennæ straight, filiform, without the fasciculi of hairs, the fourth and following joints equal and almost cylindrical: the mandibles of an ordinary size; the labrum forming a transverse square, with the anterior edge straight. The length of the labial palpi does not exceed that of those attached to the maxillæ. The thorax is cordiform and truncated, with the posterior angles acute. The two first joints of the anterior tarsi are alone dilated in the males. The eyes are less prominent than in the preceding subgenus, and the neck is not so narrow(2).

We will now pass to those Carabici whose anterior tibiæ have no emargination on the internal side, or which present one that begins close to their extremity, or that does not extend on their anterior face, and forming a mere oblique and linear canal. The ligula is often extremely short, terminated in a point in the middle of its summit, and accompanied by pointed paraglossæ. The mandibles are robust. The last joint of the exterior palpi is usually larger, compressed into the form of a reversed triangle, or securiform in some, and almost into that of a spoon in others(3). The eyes are prominent. The elytra are entire or simply sinuous at their posterior extremity. The abdomen, compared with the other parts of the body, is voluminous. They are generally large Insects, are ornamented with brilliant metallic colours, run very fast, and are extremely carnivorous. They constitute a particular section, the sixth of the genus, which we will name the GRANDIPALPI(1).

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(1) *Loricera ænea*, Lat.; *Carabus pilicornis*, Fab.; Panz. Faun. Insect. Germ., XI, 10; Oliv., Col. III, 35, xi, 119; Dej. Spec. II, p. 293. [The only species of the genus. *Am. Ed.*]

(2) *Carabus rufipes*, Fab.; *C. excavatus*, Payk.; Panz. Ib. XXXIV, 2. Two other species are mentioned by Count Dejean in his Species, one from Portugal, the other from North America.

(3) It is frequently more dilated in the males—a fact very evident in Procerus.

A first division is thus characterized: the body always thick and apterous; labrum always bilobate; last joint of the exterior palpi always very large; emargination of the mentum edentate; internal side of the mandibles entirely (or nearly so) dentated throughout its length.

Here, the mandibles are arcuated, strongly dentated throughout their length, and the lateral and exterior extremity of the two first tibiæ is prolonged into a point. The last joint of their exterior palpi forms a longitudinal semi-oval with the internal side arcuated; the internal maxillary palpi are straight; their last joint is much larger than the first, and almost ovoid. The mentum is profoundly emarginate. Such are the characters of

PAMBORUS, Lat.

Of which but a single species, the *P. alternans*, Cuv. Règ. Anim. V, xiv, 2; Dej., Spec. II, p. 18, 19, is yet known. It was brought from New Holland by Messrs Peron and Lesueur.

There, the mandibles are straight, simply arcuated, or hooked and dilated at the extremity. The lateral extremity of the two anterior tibiæ is not prolonged into a spine. The last joint of the exterior palpi is much larger than the preceding ones and concave above, almost in the form of a spoon. The mentum is deeply emarginate, longer in proportion than in the following subgenera, thickened on the sides in most of them, and as if longitudinally divided into three spaces. The elytra are soldered, carinated laterally, and embrace a part of the sides of the abdomen. These Carabici compose the genus *Cychrus* of Paykull and Fabricius, since modified as follows:

Those in which the tarsi are similar in both sexes, the thorax is cordiform and truncated, narrower posteriorly, or almost orbicular, and not raised along the sides, with the posterior angles null or rounded, alone retain the generic denomination of

CYCHRUS, Lat. Dej.(2)

Those, in which the three first joints of the anterior tarsi of the males are dilated, but slightly, and in the form of a palette, and in which the thorax forms a trapezium, wide, emarginated at both ends, with the sides turned up, and with acute and recurved posterior angles, constitute another generic section, that of

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(1) A more characteristic denomination than that of *Abdominales* which we formerly gave them.

(2) *Cychrus rostratus*, Fab.; Panz. Faun. Insect. Germ., LXXIV, 6; Clairv., Entom. Helv., II, xix, A;—*C. attenuatus*, Fab.; Panz., Ib. II, 3; Clairv. Ib., xix, B;—

SCAPHINOTUS, Lat. Dej.(1)

Finally, other species resembling the Cychri, but in which the two first joints of the anterior tarsi of the males are greatly dilated, and form a patella with the third, which is less so, and cordiform, constitute the

SPHÆRODERUS, Dej.(2)

The species of these two last subgenera are peculiar to America.

In the second division of this section, we find Carabici with a thick body, and most commonly apterous, like the preceding, but in which the middle of the emargination of the mentum is provided with an entire or bifid tooth, and where the mandibles are, at most, armed with one or two teeth, situated at their base.

The thorax is always in the form of a truncated heart. The abdomen is most frequently oval.

Some of them, in which the labrum is occasionally entire, have all the tarsi identical in both sexes.

TEFFLUS, Leach.

The Teffli are the only ones of this division in which the labrum is entire or unemarginate.

> *T. Megerle*; *Carabus Megerlei*, Fab.; Voet., Col. II, xxxix, 49. Nearly two inches in length; all black; thorax rugose; elytra divided by longitudinal ribs with elevated points in their sulci, last joint of the exterior palpi very large, elongated and securiform, the internal edge curvilinear; tooth in the emargination of the mentum small; third joint of the antennæ at least thrice the length of the second.

PROCERUS, Meg.

The labrum bilobate. All the known species are large, entirely black, or black underneath, and blue or greenish above with ex-

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C. italicus, Bonel., Obs. Entom., Mem. of the Acad. of Tur. See Dej. Spec. II, p. 4, et seq. [Am. species, *C. viduus*, Say. *Am. Ed.*]

(1) *Cychrus elevatus*, Fab.; Knoch, Beytr., I, viii, 12; Dej. Spec. II, p. 17, et seq.

(2) Dej. Spec. II, p. 14, et seq.

tremely rough elytra. They usually inhabit the mountains in the East and South of Europe, and those of Caucasus and Lebanon(1).

The others, in which the labrum is always divided into two or three lobes, have the anterior tarsi very sensibly dilated in the males.

These latter are always destitute of wings. Their mandibles are smooth, and at their base, or that of one of them, we find one or two teeth. The thorax is cordiform and truncated, sub-isometrical, or longer than it is broad. The abdomen inclines to an oval.

PROCRUSTES, Bon.

The labrum trilobate; tooth in the emargination of the mentum bifid(2).

CARABUS, Lin. Fab.—*Tachypus*, Web.

The labrum simply emarginate or bilobate; tooth of the emargination of the mentum entire.

Count Dejean describes one hundred and twenty-four species, which he has arranged in sixteen divisions. The first thirteen comprise those whose elytra are convex or arched, and the three last, those in which they are plane, and of which M. Fischer forms two genera *Plectes* and *Cechenus*(3), founded on the relative proportions of the head and thorax. The nature of the surface of the elytra furnishes the other secondary characters of these divisions, and such was the method of Messrs Clairville and Bonelli.

The greater number of these species inhabit Europe, Caucasus, Siberia, Asia Minor, Syria, and the north of Africa to the thirtieth degree of north latitude. Some few are also found at the two extremities of America, and it is probable that others may be found in the intermediate mountains(1).

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(1) *Carabus scabrosus*, Fab.; *C. gigas*, Creutz., Entom. I, 11, 13;—*C. scabrosus*, Oliv., Col. III, 35, viii, 83, long ago described and figured by Mouffet, Insect. Theat., 159;—*P. tauricus*, Dej. Spec. II, 24; *Carabus scabrosus*, Fischer, Entom. Russ., I, 11, 1, b, d, f;—*Procerus caucasicus*, Dej., Ib. p. 25; *Carabus scabrosus*, Fisch., Ib., e, e. Another but undescribed species has been found in Mount Lebanon by M. Labillardière.

(2) *Carabus coriaceus*, Fab.; Panz. Faun. Insect. Germ., LXXXI, 1. See the Spec. Dej. II, p. 26, et seq.

(3) *Carabus hispanus*, Fab.; Germ., Faun. Insect. Europ. VIII, 2;—*C. cyaneus*, Fab., Panz. Faun. Insect. Germ., LXXXI, 2;—*C. Creutzeri*, Fab.; Panz. Ib. CIX, 1;—*C. depressus*, Bonel.;—*C. osseticus*, Dej.; *Plectes osseticus*, Fisch., Entom. Russ. II, xxxiii, 3;—*C. Fabricii*, Panz. Ib., CIX, 6;—*C. irregularis*, Fab.; Panz. Ib., V, 4;—*C. pyrenæus*, Dufour.—The two last belong to the genus *Cechenus* of Fischer. Their head is wider in proportion than those of the preceding species or the Plectes, Fischer.

Of those with a convex and oblong body, the most common is the *C. auratus*, L.; Panz. Faun. Insect. Germ., LXXXI, 4, commonly called the *Jardinier*. It is about an inch long, golden green above, black underneath; the first joints of the antennæ and the legs fulvous; elytra sulcated, unidentated on the exterior margin near their extremity, particularly in the female, with three smooth ribs on each.

This Insect disappears in the south of Europe, or is only found there in the mountains(2).

Those are most generally furnished with wings. Their mandibles are transversely striated, and without any visible teeth on the internal side. The thorax is transversal, dilated equally, rounded laterally, and without any prolongation at the posterior angles. The abdomen is almost square. Their exterior palpi are less dilated at the extremity. The maxillæ are suddenly curved at the extremity. The second joint of the antennæ is short, and the third elongated. The four posterior tibiæ are arcuated in several males.

CALOSOMA, Web. Fab.—*Calosoma*, *Callisthenes*, Fisch.

This genus is much less numerous than the preceding, but the species extend from the North to the Equator.

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(1) Of the species that inhabit North America, we have as yet only discovered the *C. Beauvoisi*, *carinatus*, *Lherminier?*, *lineatopunctatus* (*serratus*, Say), *sylvosus* and *vinctus*. The mountains of New Hampshire, and Maine particularly, probably contain several others, and it is to be hoped that some friend of the science, within reach of those localities, will soon enable us to enlarge our catalogue of this interesting genus. *Am. Ed.*

(2) Add the *C. auro-nitens*, Fab.; Panz. Ib. IV, 7;—*C. nitens*, Fab.; Panz. Ib. LXXXV, 2;—*C. cœlatus*, Fab.; Panz. Ib. LXXXVII, 3;—*C. purpurascens*, Fab.; Panz. Ib. IV, 5;—*C. catenatus*, Fab.; Panz. Ib., LXXXVII, 4;—*C. catenulatus*, Fab.; Panz. Ib., IV, 6;—*C. affinis*, Panz. Ib. CIX, 3;—*C. Scheidleri*, Fab.; Panz. Ib. LXVI, 2;—*C. monilis*, Fab.; Panz. Ib. CVIII, 1;—*C. consitus*, Panz. Ib. 3;—*C. cancellatus*, Fab.; Panz. Ib. LXXXV, 1;—*C. arvensis*, Fab.; Panz. Ib. LXXIV, 3, LXXXI, 3;—*C. morbillosus*, Fab.; Panz. Ib. LXXXI, 5;—*C. granulatus*, Fab.; Panz. Ib. 6;—*C. violaceus*, Fab.; Panz. Ib. IV, 4;—*C. marginalis*, Fab.; Panz. Ib. XXXIX, 7;—*C. glabratus*, Fab.; Panz. Ib., LXXIV, 4;—*C. convexus*, Fab.; Panz. Ib. 5;—*C. hortensis*, Fab.; Panz. Ib. V, 2;—*C. nodulosus*, Fab.; Panz. Ib. LXXXIV, 4;—*C. sylvestris*, Fab.; Panz. Ib. V, 3;—*C. gemmatus*, Fab.; Panz. Ib. LXXIV, 2;—*C. cœruleus*, Panz. Ib. CIX, 2;—*C. concolor*, Fab.; Panz. Ib. CVIII, 2;—*C. Linnæi*, Panz. Ib. CIX, 5;—*C. angustatus*, Panz. Ib. 4. For the other species of this subgenus, and the synonymes of the whole, see the Spec., Dej. II, p. 30—189.

C. sycophanta; Carabus sycophanta, L.; Clairv., Entom. Helv. II, xxi, A. From eight to ten lines in length; violet black; elytra golden-green or brilliant cupreous, and finely striated, each with three series of impressed and distant points.

Its larva inhabits the nest of the *processionary caterpillars*, on which it feeds, consuming several of them in the course of a day; when filled to satiety, it loses all activity, and other larvæ of the same species attack and devour it. It is black, and frequently found running about on the ground or trees, particularly the oak(1).

The third and last division of the Grandipalpi presents an ensemble of characters which clearly distinguishes it from the preceding ones. Most of the species that compose it are winged. The anterior tarsi of the males are always dilated. The labrum is entire. The exterior palpi are merely somewhat dilated or thicker at the extremity, with the last joint in the form of a reversed and elongated cone. The internal side of the mandibles presents no tooth worthy of notice; that in the middle of the emargination of the mentum is bifid. The middle of the superior margin of the ligula is e[illegible]vated into a point. On the internal side of the anterior tibiæ of several is a short emargination, or one of the two spurs is inserted higher than the other, so that in this respect these Carabici are ambiguous, and might be placed, as well as those of the ensuing section, directly after the Patellimani(2). They usually frequent wet places. Some of them, such as Omophron, appear to connect this tribe with the following one or the Aquatic Carnivora.

Some, in which the body is flattened, or convex and suborbicular, are provided with eyes of an ordinary size; their antennæ are linear and generally consist of elongated and almost cylindrical joints; the external sides of the maxillæ are bearded, and the two internal spines of the two anterior tibiæ on a level at their origin; these tibiæ merely have a simple longitudinal canal.

Sometimes the body is a flattened oblong oval, with a cordiform and truncated thorax posteriorly narrowed. The scutellum is distinct. The three first joints of the anterior tarsi of the males are dilated.

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(1) Add *C. inquisitor*, Fab.; Panz. Faun. Insect. Germ. LXXXI, 7;—*C. reticulatum*, Fab.; Panz. Ib. 9;—*C. indagator*, Fab.; Clairv., Ent. Helv. II, xxi, B;—*C. scrutator*, Fab.; Leach, Zool. Miscell. XCIII, *C. calidum*, Fab.; Oliv., Col. III, 35, IV, 45, and II, 21.—The *C. porculatum* of Fabricius is a Helops. See Dej. Spec. II, p. 190, et seq. [The American species are the *C. calidum, luxatum, Sayi* and *scrutator*. Count Dejean is mistaken in supposing the *calidum* to be a common species—it is rare even in the south, where, I believe, it is only to be found. The *Sayi* is very common. *Am. Ed.*]

(2) The Pogonophori are closely allied to the Loriceræ.

Pogonophorus, Lat. Gyllen.—*Leistus*, Frœl. Clairv.—*Carabus*, Fab. —*Manticora*, Panz.

Remarkable for the elongation of the exterior palpi, those of the labium being longer than the head, for the mandibles, the external side of which forms a salient and flattened angle, and for the projecting ligula terminated by three spines. The head is suddenly narrowed behind the eyes, and the joints of the antennæ are long and slender. All the species known belong to Europe(1).

Nebria, Lat.

The Nebriæ only differ from the Pogonophori in negative characters, or in the much greater shortness of the palpi; in the want of dilatation in the external side of the mandibles, which merely forms a very small auricle, not extending beyond the base of the jaws; and in the absence of the strangulation, or neck, in the head. The antennæ are also proportionably thicker, and composed of shorter joints(2).

Alpæus, Bon.

Mere apterous Nebriæ, somewhat more oblong, that especially inhabit high mountains(3).

Sometimes the body, arched or convex above, is nearly orbicular, the thorax very short, transversal, strongly emarginate anteriorly, and wider and lobulate posteriorly. The scutellum is not apparent. The first joint alone of the two anterior tarsi of the males—and sometimes that of the intermediate ones as in the *O. mélangé*—is sensibly dilated.

Omophron, Lat.—*Scolytus*, Fab.

This subgenus is composed of a small number of species found on the shores of rivers, &c. in Europe, North America, Egypt and the Cape of Good Hope. M. Desmarest has described the larva of the most common species. Its form approaches that of the larva of a Dytiscus. The anatomical observations of M. Dufour appear to confirm this affinity(1).

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(1) *Carabus spinibarbis*, Fab.; *Leistus cæruleus*, Clairv. Entom. Helv., II, xxiii, A, a;—*C. spinilabris*, Fab.; *Leistrus rufescens*, Ib. B, b;—*C. rufescens*, Fab.; *Carabus terminatus*, Panz., Faun. Insect. Germ., VII, ii. For the other species, see Spec. Dej., II, p. 212, et seq.

(2) *Nebria arenaria*, Lat. Gener. Crust. et Insect., I, 2, vii, 6;—*Carabus brevicollis*, Fab.; Panz. Ib. XI, 8; Clairv. Ib. XXII, B;—*C. subulosus*, Fab.; Clairv., Ib. A; Panz., Ib. XXXI, 4;—*C. picicornis*, Fab.; Panz. Ib. XCII, 1;—*C. psammodes*, Ross., Faun. Etrusc., Mant. I, v, M.

(3) The *C. Helwigii*, Panz Ib. LXXXIX, 4, is an Alpæus. See Spec. Dej. II, p. 221, et seq.

The others, in which the body is tolerably thick, have large and very prominent eyes; antennæ that are slightly enlarged near the extremity, and composed of short joints, mostly in the form of a top or of a reversed cone; one of the two spurs of the internal extremity of the two anterior tibiæ is inserted higher than the other, with a notch between them. The four or three first joints of the anterior tarsi of the males are in general but slightly dilated. The palpi are never elongated. They are shore Insects, and peculiar to Europe and Siberia.

Sometimes the labrum is very short, transversal, and terminated by a straight line. The last joint of the exterior palpi is almost obconical, thicker and truncated at the extremity. The mandibles advance considerably beyond the labrum. The anterior tarsi of the males are sensibly dilated.

Elaphrus, Fab.—*Elaphrus*, *Blethisa*, *Pelophila*, Dej.

In some of them, and the largest—*Blethisa*, Bonelli—the thorax is wider than it is long, plane, bordered laterally, almost square and slightly narrowed towards the posterior angles.

Here, the three first joints of the anterior tarsi of the males are strongly dilated and cordiform. They are the *Pelophilæ* of Dejean(2).

There, the four first joints of the anterior tarsi of the males are slightly dilated—they form the *Blethisa*, Dejean(3).

In the others, the thorax is at least as long as it is wide, convex, cordiform and truncated. The body is proportionably more convex than in the preceding subgenera. The four first joints of the anterior tarsi are slightly dilated in the males. These latter alone compose his genus Elaphrus.

E. uliginosus; *C. uliginosus*, Fab.; *Elaphrus riparius*, Oliv., Col. II, 34, I, 1, A—E. About four lines in length, of a blackish-bronze, with numerous puncta; little depressions or fossulæ on the front and thorax, and others with a violet bottom and elevated contour joined to each other on the elytra; tarsi bluish-black; tibiæ sometimes of the latter colour and sometimes russet. These latter individuals have been considered as a distinct species—*cupreus*—by MM. Megerle and Dejean. It is rare in the environs of Paris, but common in other parts of France, and in Germany, Sweden, &c.

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(1) See Encyclop. Méthod., article *Omophron*; Entom. Helv., II, xxvi; Lat., Gener. Crust. et Insect. I, 225, vii, 7, and the Spec. Dej., II, p. 257, et seq.

(2) *Carabus borealis*, Fab.; *Nebria borealis*, Gyllenh.; Panz. Faun. Insect. Germ., LXXV, 8.

(3) *Carabus multipunctatus*, Fab.; Panz. Ib. XI, 5.

E. riparius, Fab., Clairv., Entom., Helv., II, xxv, A, a; *Cicindela riparia*, L.; *Elaphrus paludosus*, Oliv., Col. II, 34, 1, 4, a, b; Panz., Faun. Insect. Germ. xx, 1. About a third less than the uliginosus; above, very finely dotted with dead-cupreous, mixed with green; circular green impressions with papillated centres arranged in four lines, and a polished, shining cupreous spot on each elytron near the suture. Common in the environs of Paris(1).

Sometimes the labrum is almost semicircular and rounded anteriorly; the exterior palpi terminate by a sub-oval joint, narrowed into a point at the extremity. The mandibles project but little beyond the labrum. Tarsi identical in both sexes.

The anterior extremity of the head forms a small snout. The body is plane above, and the thorax trapezoidal, almost as wide as the head, and slightly narrowed posteriorly.

NOTIOPHILUS, Dumer.—*Elaphrus*, Fab. Oliv.(2)

Our second general division of this tribe, or that of the SUBULIPALPI, is distinguished from the preceding one by the form of the exterior palpi, of which the penultimate and obconical joint is united to the following, forming with it a common oval or fusiform body, terminated, either insensibly or suddenly, in a point, or in the manner of an awl. The internal side of the two anterior tibiæ is always emarginated. These Insects, both as respects their form and mode of living, are very similar to the preceding ones.

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(1) For the other species, see Dej. Spec. II, p. 268, et seq.

(2) *Cicindela aquatica*, L.; *Elaphrus aquaticus*, Fab.; Panz., Faun. Insect. Germ., XX, 3;—*Elaphrus biguttatus*, Fab., and to which Count Dejean refers his *C. semipunctatus*. See Spec. II, p. 276, et seq.

This division, in a natural series, should probably be placed directly after that of the Carabici Quadrumani. In the genus *Masoreus*, Dejean, (p. 420), the two anterior tarsi of the males resemble those of Harpali; the emargination of the mentum is destitute of a tooth as in *Stenolophus*, *Acupalpus*, &c.; but the maxillary palpi terminate nearly as in *Bembidion;* the two last joints are united and form one body, the penultimate merely being rather shorter than the last and obconical, and the latter, cylindrical and truncated.

The genera *Pogonus* and *Cardiaderus* of Count Dejean appear to us to be connected with the *Amara* of Bonelli, notwithstanding the difference in their tarsi. From what we observe in the Cicindeletæ and the Carabici Grandipalpi, evidently natural divisions, it may be seen that the tarsi vary according to the sex, and that if we chiefly depend on characters drawn from these parts, we may form sections, methodical it is true, but which are in direct opposition to the natural order.

Bembidion, Lat.—*Bembidium*, Gyll. Dej.

Penultimate joint of the exterior palpi large, inflated, and turbinated; the last much more slender, very short or acicular; first joint of the two anterior tarsi dilated in the males.

Messrs Ziegler and Megerle have divided this subgenus into several others(1), but without giving their characters, and depending, as it would appear, on the changes in the form of the thorax.

The following species is placed by Count Dejean among his Tachypi.

B. flavipes; Panz. Faun. Insect. Germ. XX, 2; *Cicindela flavipes*, L. Very similar to the *Elaphrus riparius;* two lines in length; thorax rather narrower than the head, cordiform, truncated, and as long as it is wide; eyes large; the body blackish; green above, bronzed beneath and mottled with cupreous-red; two large impressed puncta on each elytron near the suture; base of the antennæ, palpi and legs yellowish. Very common in the environs of Paris(1).

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(1) This subgenus may be thus divided. In some the thorax is less depressed, is at least as long as it is wide, much narrower posteriorly than before, cordiform and truncated, with the posterior angles very short or but slightly elongated.

Those in which this part of the body presents no decided impression at its posterior angles, and whose eyes are very large and cause the head to appear wider than the thorax, form the genus *Tachypus* of Megerle.

Those whose eyes, as in all the following divisions, are less prominent, so that the thorax is not wider than the head, but otherwise presenting similar characters, constitute the *Bembidium* properly so called of Dejean.

The Count, with Megérle, places in the genus *Lopha* those in which the thorax, having the same form and proportions, presents at each posterior angle a marked impression, so that these angles are well bordered.

The others have a flatter body, the thorax wider than it is long and proportionably less narrowed posteriorly; its posterior angles always exhibit a strong impression and a little oblique carina.

Certain species, whose thorax, although narrowed near the posterior angles, is less than in the others, so that the posterior margin is scarcely narrower than the anterior, compose the genus *Notaphus*, Dej. and Megerle.

Among those in which the thorax is considerably narrowed behind, its length is sometimes only a little greater than its width, and it has the form of a truncated heart: such are the *Peryphus* of these naturalists. Sometimes much shorter in proportion, its form approaches that of a cup or of a heart with a very broad base; in some it is even rounded at the posterior angles. They form the genus *Leja* of the same. The Tachypi, on account of the extraordinary protuberance of their eyes, and other relations to the Elaphri, are sufficiently distinct; but such is far from being the case with the other genera; it is impossible to mark them by rigorous characters. Those which might be drawn from the respective and comparative length of the second and third joint of the antennæ, appear to me to be also uncertain. See the Catal. de la Coll. des Coleop., of Dejean.

Trechus, Clairv.

The last joint of the exterior palpi, from its thickest part to its origin, as long as the preceding or longer, so that the two united make a fusiform body(2)

The Pentamerous Aquatic Carnivora form a third tribe, that of the Hydrocanthari, Lat. The feet of these Insects are fitted for natation; the four last are compressed, ciliated or laminiform, and the two last at a distance from the others; the mandibles are almost entirely covered; the body is always oval, the eyes but slightly prominent, and the thorax much wider than long. The terminal hook of the maxillæ is arcuated from its base; those at the extremity of the tarsi are often unequal.

They compose the genera *Dytiscus* and *Gyrinus* of Geoffroy.

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(1) Add *Carabus tricolor*, Fab.;—*C. modestus*;—*cursor*;—*biguttatus*;—*4-guttatus*;—*guttula*, Id.;—*C. minutus*, Panz. Faun. Insect. Germ. XXXVIII, 10;—*C. pygmæus*, Fab.; Panz. Ib. 11;—*C. articulatus*, Panz. Ib. XXX, 21;—*Cicindela quadrimaculata*, *L.*; *Carabus pulchellus*, Panz. Ib. XXXVIII, 8; XL, 5;—*C. doris*, Panz. Ib. 9;—*Elaphrus rupestris*, Fab.; Panz. Ib. XL, 6;—*C. decorus*, Panz. Ib. LXXIII, 4;—*C. ustulatus*, L.; Panz. Ib. XL, 7, 9;—*C. bipunctatus*, L.; Oliv. Col. III, 35, xiv, 163;—*Elaphrus ruficollis*, Panz. Ib. XXXVIII, 21;—*Elaphrus impressus*, Fab.; Panz. Ib. XL, 8;—*Elaphrus paludosus*, Ib. XX, 4.

(2) *Trechus rubens*, Clairv., Entom. Helv., II, ii, B, b. The *Carabus meridianus*, which he figures in the same plate, A, a, is a Stenolophus —*Carabus micros*, Panz., Faun. Insect. Germ. XL, 4.—The genus Masoreus of Ziegler and Dejean, appears to me to approach that of *Trechus*. The species on which it is founded is closely allied to the *Harpalus collaris* of Gyllenhal. The maxillary palpi, as in Trechus, have a fusiform termination, the penultimate joint merely being a little shorter than the last. The anterior tarsi are slightly dilated in the males. This Insect seems to connect Trechus with various small species of the Stenolophus of Dejean.

The *Blemi* of these same savans are a kind of narrower and more elongated Trechi with a subisometrical thorax, in the form of a reversed and truncated triangle, with much larger mandibles that project beyond the labrum. They are found along the sea-coast of France, under stones, and even in the sea.

They pass their first and last stage of existence in the fresh and placid waters of lakes, marshes, ponds, &c. They are good swimmers, and rise occasionally to the surface of their liquid abodes in order to respire; this they easily effect by keeping their legs motionless, and permitting themselves to float. Their body being reversed, they elevate its posterior extremity a little above the water, raise the extremity of their elytra, or depress the end of the abdomen, in order that air may enter the stigmata, which are covered by them, whence it finds its way to the tracheæ. They are excessively voracious, and feed, on small animals inhabiting the same element, which they never leave excepting during the night, or at its approach. When taken from the water they diffuse a nauseating odour. They are frequently attracted into houses by the light of candles, &c.

Their larvæ have a long and narrow body composed of twelve rings, the first of which is the largest; a stout head, provided with two powerful mandibles, curved into an arc, and perforated near the point; small antennæ, palpi, and six simple approximated eyes on each side. They have six tolerably long legs, frequently fringed with hairs, and terminated by two small nails. They are active, carnivorous, and respire either by the anus or by a kind of fins resembling branchiæ. When about to enter into their pupa state they leave the water.

This tribe consists of two principal genera.

Dytiscus, Geoff.

The Dytisci have filiform antennæ longer than the head, two eyes, the anterior legs shorter than the following ones, and the last most commonly terminated by a compressed tarsus ending in a point(1). By means of their legs fringed with long hairs, the two last particularly, they are enabled to swim with great velocity. They dart upon other Insects, aquatic Worms, &c. In most of the males the three first joints of the four anterior tarsi are widened and spongy underneath; those of the first pair particularly are very remarkable in the larger species, these three joints forming there a large palette, the inferior surface of which is covered by little bodies, some in the form of papillæ, and others, larger, in that of cups or suckers, &c. Some of the females are distinguished from their males by their sulcated elytra. The body of the larva is composed of from eleven to twelve annuli, and covered with a squamous plate; this larva is long, ventricose in the middle, and slender at each end, particularly behind, where the last annuli form an elongated cone furnished on the sides with a fringe of floating hairs, with which the animal acts on the water, and propels its body forwards; the latter is usually terminated by two conical, bearded and movable filaments. Between them are two small cylindrical bodies, perforated at their extremity by a hole, which are so many air-ducts, and in which the two tracheæ terminate; stigmata, however, are observed on the sides of the abdomen. The head is large, oval, attached to the thorax by a neck, and furnished with strongly arcuated mandibles, under the extremity of which De Geer perceived a longitudinal slit, so that, in this respect, these organs resemble the mandibles of the larva of the Myrmeleon, and serve as suckers; the mouth, however, is provided with maxillæ and a labium with palpi. Each of the three first annuli bears a pair of tolerably long legs, the tibiæ and tarsi of which are bordered with hairs which afford them additional aid in swimming. The first ring is the largest or longest, and is defended above as well as underneath by a squamous plate.

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(1) According to M. Leon Dufour, their crop is terminated behind by an annular roll (bourrelet) a character not found in the preceding tribe. Their cæcum forms a natatory bladder. Their pectus contains two pneumatic sacs, while the tracheæ of the other parts are tubular. The adipose splanchnic tissue possesses the characters of a true epiploon or mesentery. Their stigmata also differ from those of the Terrestrial Carnivora.

These larvæ suspend themselves on the surface of the water by means of two lateral appendages at the extremity of their body, which they keep above it. When they wish to change their position, they communicate a sudden vermicular motion to their body, and strike the water with their tail. They feed more particularly on the larvæ of the Libellulæ, and those of the Culices and Aselli. When the period of their metamorphosis has arrived, they issue from the water, and having gained the shore penetrate into the earth, which must, however, be constantly moistened, or very humid. They then excavate an oval cavity, and shut themselves up in it.

According to Rœsel, the eggs of the *D. marginalis* are hatched from ten to twelve days after they are laid. In four or five days after this epoch, the larva is already five lines in length, and undergoes its first change of tegument. The second ensues at the expiration of a similar period, and the animal is then double its former size. Its final length is two inches. They have been observed, in summer, to enter into their pupa state at the end of fifteen days, and to become perfect insects in fifteen or twenty more. Besides the cloaca of the Insects of this family, the Dytisci have a tolerably long cæcum, which is perceptible even in the larva.

This great genus is subdivided as follows:

Some have antennæ composed of eleven distinct joints, the exterior palpi filiform or somewhat larger at the extremity, and the base of their posterior feet as well as that of the others exposed.

Sometimes the thickness of the antennæ gradually diminishes from their origin to the extremity; the last joint of the labial palpi is simply obtuse at the end and unemarginate. Such is

Dytiscus, proper.

Where all the tarsi are composed of five very distinct joints, of which the three first of the two anterior ones are very wide, forming, collectively, a palette, either oval and transverse, or orbicular.

D. latissimus, L.; Panz. Faun. Insect. Germ. LXXXVI, 1. About an inch and a half long, and easily distinguished by the compressed and trenchant dilatation of the exterior margin of the elytra, the border of which is yellowish; thorax margined all round with the same colour; elytra sulcated and carinated in the female. From the department of Vosges in the north of Europe and from Germany.

D. marginalis, L.; Panz. Ib. 3. About a fourth smaller; a yellowish border all round the thorax, and a line of the same colour on the exterior and non-dilated margin of the elytra; those of the female sulcated from their base to about two-thirds of their length.

Fabricius says that if laid on its back, it soon regains its natural position by jumping.

Esper preserved a D. marginalis for three years and a half, in perfect health, in a large glass jar. Every week, and sometimes oftener, he threw into the vessel a piece of raw beef about the size of a filbert, on which it darted with great avidity, and then completely exhausted its blood by suction. It can go without food for at least four weeks. It kills the Hydrophilus piceus, although double its own size, by piercing it between the head and thorax, the only part of the body that is unarmed. According to Esper, it is affected by atmospheric changes, and indicates them by the height at which it remains in the jar.

D. Rœselii, Fab.; Rœs., Insect., II, Aquat., Class I, ii. Narrower, or more oval and more depressed than the preceding ones; exterior margin of the thorax and elytra yellowish; the latter finely striated in the female. Environs of Paris, and Germany.

D. serricornis, Payk., Nov. Acad. Sc. Stock., XX, i, 3. Remarkable for the anomalous form of the antennæ of the male, the four last joints of which form a compressed and serrated mass(1).

Colymbetes, Clairv.

All the tarsi composed of five very distinct joints; but the four anterior, in the males, have the three first equally dilated, constituting, collectively, a small palette forming a long square; the antennæ, at least the length of the head and thorax. The body is perfectly oval, and wider than it is high; the eyes are not protuberant, or but very slightly so(2).

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(1) Doctor Leach has established his genus Agabus—Zool. Miscel. III, p. 69 and 72—on this character. Certain slight differences in the form and relative proportions of the joints of the exterior maxillary palpi have also induced him to establish some others, such as Hydaticus (*D. Hybneri, transversalis, stagnalis, 4-vittatus*): Acilius (*D. sulcatus*): and Trogus (*D. lateralis*). The last is the only one that can be retained on account of some other characters. The tibiæ of the posterior legs are short and very wide, and the tarsi are only terminated by a single hook.

To the species above quoted add *D. sulcatus*, Fab.; Clair., Entom. Helv., II, xx;—*D. costalis*, Oliv. Col. III, 40, 1, 7;—*D. punctatus*, Ib. I, 6, b and I, e;—*D. aciculatus*, Ib. III, 30;—*D. lævigatus*, Ib., 23;—*D. tripunctatus*, Ib. 24;—*D. ruficollis*, Ib. II, 20;—*D. vittatus*, Ib. I, 5;—*D. griseus*, Ib., II, 12;—*D. sticticus*, Ib. II, 11;—*D. circumflexus*, Fab. [Of American species the *D. fimbriolatus, verticalis, mediatus, tæniolis*, &c. *Am. Ed.*]

(2) *D. fuscus*, Panz., Faun. Insect. Germ., LXXXVI, 5;—*D. cinereus*, Fab.; Panz. Ib., XXXI, 2;—*D. zonatus*, Fab.; Panz., Ib., XXXVIII, 3;—*D. bipunctatus*, Fab.; Panz., Ib., XCI, 6;—*D. fenestratus*, Fab.; Panz. Ib. XXXVIII, 16;—*D. chalconatus*, Fab.; Panz. Ib. 17;—*D. ater*, Fab. Panz. Ib., 15;—*D. guttatus*, Payk.; Panz., Ib., XC, 1;—*D. fuliginosus*, Fab.; Panz., Ib., XXXVIII, 14;—*D. bipustulatus*, Fab.; Panz., Ib., CI, 2;—*D. stagnalis*, Fab.; Panz., Ib. XCI, 7;—*D. transversalis*, Fab.; Panz., Ib., LXXXVI, 6;—*D. abbreviatus*, Fab. Panz. Ib. XIV, 1;—*D. maculatus*, Fab.; Panz., Ib., 7;—*D. agilis*, Fab.; Panz., Ib. XC, 2;—*D. adspersus*, Fab.; Panz., Ib., XXXVIII, 18;—*D. minutus*, Fab.; Panz., XXVI, 3, 5;—*D. Leander*, Oliv., Ib. III, 25;—*D. varius*, Oliv., Ib. II, 17;—*D. bimaculatus*, Oliv., Ib. 18. See Clairv., Entom. Helvet. II, genus *Colymbetes*.

Certain small species without any distinct scutellum, and in which the anterior tarsi of the males are but slightly dilated, compose the genus Lacophilus of Leach, who cites the following: *D. hyalinus*, Marsh;—*D. interruptus*, Panz.?—*D. minutus*, L.;—*D. marmoreus*, Oliv. See his Zool. Miscell. III, p. 72.

Hygrobia, Lat.—*Hydrachna*, Fab. Clairv.—*Pœlobius*, Schœnh.

The tarsi also composed of five distinct joints, the four anterior of which are almost equally dilated at base, in the males, into a little palette forming a long square; but the antennæ are shorter than the head and thorax; the body is ovoid and very thick in the middle; eyes prominent(1).

Hydroporus, Clairv.—*Hyphydrus*, Schœnh.

The four anterior tarsi nearly similar, and spongy underneath, in both sexes, composed of but four distinct joints, the fifth being deficient or very small and concealed, as well as a part of the last, in a deep cleft in the third.

These Insects have no apparent scutellum(2).

We might separate from them some species(3) in which the body is almost globular, and where the last joint of the four anterior tarsi is very small and projects but little beyond the preceding one—*Hyphydrus*, Lat.—The body of the rest is oval, and not so thick(4).

Sometimes the antennæ are slightly dilated and wider in the middle of their length; the last joint of the labial palpi is emarginate, and appears forked.

Add for the American species of Colymbetes the *C. erythropterus*, *fenestralis*, *ambiguus*, *seriatus*, *nitidus*, *bicarinatus*, *venustus*, *glyphicus*, *obtusatus*, &c. Of the G. Lacophilus we have the *L. maculosus and proximus*. *Am. Ed.*

(1) *Hydrachna Hermanni*, Fab.; Lat. Gener. Crust. et Insect., I, vi, 5; Clairv., Entom. Helv. II, xxvii, A, a;—*H. uliginosa*, Clairv., Ib. B, b.

These Insects with the Halipli, in the system of Leach—Zool. Miscell. p. 68—form a particular group, the characters of which are: a scutellum; all the legs adapted for walking, with five joints to all the tarsi and two terminal hooks to the last.

The Hygrobiæ have their exterior palpi somewhat enlarged at the end; two stout and approximated spurs at the extremity of the tibiæ, and their anterior tarsi susceptible of being doubled under the tibiæ to which they are annexed.

(2) In the preceding divisions, some small species excepted, it is very apparent.

Add of American species the *Hydrop. undulatus*, *oppositus*, *niger*, *catascopium*, *lacustris*, *parallelus*, *undulatus*, &c. *Am. Ed.*

(3) The Hyd. *gibba*, *ovalis*, *scripta*, Fab.; *Hyphydrus lyratus*, Schœnh., Synon. Insect., II, iv, 1.

(4) The Dytisci *inæqualis*, *reticulatus*, *confluens*, *picipes*, *pictus*, *geminus*, *lineatus*, *halensis*, *duodecim-pustulatus*, *dorsalis*, *sex-pustulatus*, *palustris*, *depressus*, *lituratus*, *planus*, *erythrocephalus*, *nigrita*, *granularis*, Fab. See Schœnherr, Synon. Insect. II, genus *Hyphydrus*;—Panz., Index Entom., genus *Hydroporus*;—and Clairv., Entom. Helv. II, the same genus.

Noterus, Clairv.

No scutel; tarsi consisting of five distinct joints, and the two first of the four anterior dilated in the males, forming an elongated palette; first joint of the two anterior tarsi covered by a broad laminiform spur, the part of the pectus bearing the last legs with a deep groove on each side(1).

The others have but ten distinct joints in their antennæ; their exterior palpi are fusiform, or have a more slender termination tapering to a point, and the base of the posterior legs is covered with a large shield.

The body is convex and ovoid underneath, as in Hygrobia; but there is no scutel, and all the tarsi are filiform, composed of five almost cylindrical joints, and have nearly the same form in both sexes. They are the

Haliplus, Lat.—*Hoplitus*, Clair.—*Cnemidotus*, Illig.(2)

The second genus of the Hydrocanthari, or the

Gyrinus, Lin.

Comprises those in which the antennæ are clavate and shorter than the head; the two first legs are long and project like arms; the remaining four are compressed, wide, and pinnate. There are four eyes.

The body is oval and usually very glossy. The second joint of the antennæ, which are inserted in a cavity before the eyes, is prolonged exteriorly in the form of an auricle, and the following joints(3) are very short, crowded, and united in one almost fusiform and slightly curved mass. The head is sunk in the thorax almost to the eyes, which are large, and divided by a border, in such a way that two are above and two underneath. The labrum is rounded and strongly ciliated before. The palpi are very small, and the interior of those attached to the maxillæ are wanting, or are not developed in several, and particularly the larger species. The thorax is short and transversal. The elytra are obtuse and truncated at their posterior extremity, leaving the anus exposed, which ends in a point. The two anterior legs are long, slender, folded in two, and when contracted, almost at a right angle with the body; they are terminated by a very short, strongly compressed tarsus, the inferior surface of which, in the males, is furnished with a fine compact brush. The four others are broad and extremely thin, the joints of their tarsi forming little leaflets arranged like a flounce.

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(1) *Dytiscus crassicornis*, Fab.; Clairv., Entom. Helv., II, xxxii.

(2) The Dytisci *fulvus, impressus* and *obliquus*, Fab. See Latr., Gener. Crust. et Insect., I, p. 234; Clairv., Entom. Helv., II, genus *Hoplitus*, XXXI; Panz., Ind. Entom., genus id., and Schœnerr, Synonym. Insect. II, genus *Cnemidotus*. [American species, *Hal.* 12-*punctatus*, *triopsis*, &c. *Am. Ed.*]

(3) But seven are distinctly visible, the first and last of which are the longest.

The Gyrini are usually small, or of a moderate size. They are to be found from the very beginning of spring until the end of autumn, on the surface of stagnant waters, and even on that of the Ocean, where, frequently collected in troops, they appear like brilliant points, swimming and wheeling with great agility in all sorts of curves, and in every direction, whence the name of *Puce aquatique* and *Tourniquet* given to them by authors. Sometimes they remain motionless, but the instant any one approaches, they escape by swimming, and dive with great celerity. Their four last legs serve them as oars, and the two before for seizing their prey. Placed on water, the superior surface of their body is always dry, and when they dive, a little bubble of air, resembling a silvery globule, remains fixed to its posterior extremity. When seized, a lacteous fluid oozes from their body which spreads over it, and which, perhaps, produces that disagreeable and penetrating odour they then diffuse, and which remains attached to the fingers for a long time. They copulate on the surface of the water. Sometimes they remain at the bottom clinging to plants: there, also, it is probable they secrete themselves to pass the winter(1).

G. natator, L.; Panz., Faun. Insect. Germ., III, 5; De Geer, Insect., IV, xiii, 4, 19. Three lines in length; oval, glabrous, very glossy; bronze-black above; black beneath; legs fulvous; scutel triangular, very pointed, somewhat longer than wide; elytra rounded at the extremity, and marked with small impressed puncta in regular and longitudinal lines.

The female lays her eggs on aquatic plants. They are very small, and form little yellowish white cylinders. The body of the larva is long, tapering, linear, and consists of thirteen annuli, each of the three first bearing a pair of legs. The head is large, of an elongated oval shape, and much flattened, presenting the same parts as that of the larva of a Dytiscus; but here the fourth and seven following annuli are furnished on each side with a conical, membranous, flexible filament with bearded edges. The twelfth ring has four similar, but much longer ones, directed more posteriorly. Two very slender tracheæ traverse the whole length of the body, and receive an air vessel from each filament. The last ring is very small, and is terminated by four long and parallel hooks. This larva inhabits the water, from which it issues in the beginning of August to become a chrysalis. It encloses itself in a little oval cocoon, pointed at the ends, formed of a material drawn from its body resembling grey paper, which it fixes to the reeds. Very common in Europe(1).

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(1) M. Leon Dufour, Ann. des Sc. Nat., Oct. 1824, has published some anatomical observations on these Insects. The small intestine is remarkable for its length. The cæcum is not lateral as in Dytiscus. The genital organs of the males differ from those of the other Carnivora.

FAMILY II.

BRACHELYTRA.

In the second family of the Pentamerous Coleoptera we find but one palpus to the maxillæ, or four in all; the antennæ, sometimes of equal thickness, and at others slightly enlarged at the end, are usually composed of lenticular or graniform joints; the elytra are much shorter than the body, which is narrow and elongated, and the coxæ of the two anterior legs are very large; near the anus are two vesicles which the animal protrudes at will.

These Coleoptera compose the genus

STAPHYLINUS, Lin.

The Staphylini have been considered as forming the passage from the Coleoptera to the *Forficulæ*, the first genus of the following order.

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(1) For the other species see Oliv., Col. III, No. 41, and Schœnh., Synon. Insect., II, No. 55. The *Gyr. minutus* and *bicolor*, Fab., are also found in the vicinity of Paris. The largest of the species, all of which are foreign to Europe, have no apparent scutel and but four palpi.

M. Mac-Leay, Jun.—Annul. Javan. I, p. 30—forms a particular genus, DINEUTES, with those in which the labrum is not ciliate, the palpi are clavate, the anterior legs the length of the body, and the termination of the antennæ is partly pointed. He quotes but a single species, the *D. politus*.

Add American species of Gyrinus, the *Gyr. americanus, emarginatus, analis* and *limbatus*. *Am. Ed.*

They also approximate, in some respects, to the Insects of the preceding family, and to the Silphæ and Necrophori, (genera of the fourth) in many others. They commonly have a large, flattened head, stout mandibles, short antennæ, a thorax as wide as the abdomen, and the elytra truncated at the extremity, but still covering the wings, which preserve their usual extent. The semi-annuli of the top of the abdomen are as scaly as those of the venter. The vesicles of the anus consist in two conical and pilose points, which are protruded and retracted at the will of the animal; a subtile vapour escapes from them, which, in some species, has a strong odour of sulphuric ether. M. Leon Dufour, Ann. des Sc. Nat. VIII, p. 16, has described the apparatus which produces it. The last segment of the abdomen, that which contains the anus, is prolonged and terminates in a point.

These Insects, when touched, or while they run, elevate the extremity of their abdomen and flex it in every direction. They also use it to push their wings under the elytra. The tarsi of their two anterior legs are frequently broad and dilated, and their coxæ as well as those of the intermediate legs are very large. They are usually found in earth, dung, and excrementitious matters; some live in mushrooms, rotten wood, or under stones; others are only met with in aquatic localities. Some very small ones keep on flowers. They are all voracious, run with great swiftness, and take wing very promptly.

The larva bears a close resemblance to the perfect Insect: it has the figure of an elongated cone, the base of which is occupied by the very large head; the last ring is prolonged into a tube, and is accompanied by two conical and hairy appendages. It feeds on the same matters as the perfect Insect.

The first stomach of the Staphylini is small and without plicæ; the second is very long and pilose; the intestine is extremely short(1).

It is a very extensive genus, which we will divide into five sections.

In the first, or that of the Fissilabra, the head is completely exposed and separated from the thorax, which is sometimes square or semi-oval, and at others rounded, or cordiform and truncated, by a neck or sensible strangulation. The labrum is profoundly cleft and forms two lobes. Such is the

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(1) According to M. Dufour, the only essential difference between their alimentary canal and that of the carnivorous Coleoptera consists in the absence of the crop. Their biliary vessels are inserted at the same lateral point, and, at least in some species, present near the middle, a knot or vesicle, not observed in any other Insects. Their sexual apparatus differs greatly from that of the carnivorous Coleoptera. See Ann. des Sc. Nat., Octob. 1825.

OXYPORUS, Fab.

Where the maxillary palpi are filiform, and those attached to the labium are terminated by a very large and lunate joint. The antennæ are large, perfoliate and compressed; the anterior tarsi are not dilated; the last joint and then the second are the longest. They inhabit the Boleti and Agarici.

O. rufus; Staphylinus rufus, L.; Panz. Faun. Insect. Germ., XVI, 19. About three lines in length; fulvous; head, pectus, extremity and interior margin of the elytra, as well as the anus, black(1).

ASTRAPÆUS, Grav.

The four palpi terminated by a larger and nearly triangular joint; anterior tarsi greatly dilated, the first and last joints the longest(2). In the

STAPHYLINUS, Fab.

Or the true Staphylini, all the palpi are filiform, and the antennæ are inserted between the eyes, above the labrum and mandibles.

Some, particularly the males, have the anterior tarsi greatly dilated, and the antennæ separated at base; the length of the first joint of the latter is equal, at most, to that of a fourth of the whole number. The head is but slightly elongated. In some systems, those species alone which present the above characters, constitute the genus Staphylinus. The *S. dilatatus*, Fab., Germ., Faun. Insect. Europ., VI, 14, has even been separated from it, to compose another, on account of its antennæ, which form an elongated serrated club. According to the observations of M. Chevrolat, a zealous entomologist, this Insect feeds on caterpillars which it searches for on trees.

S. hirtus, L.; Panz., Faun. Insect. Germ., IV, 19. Ten lines in length; black; very hairy; superior surface of the head, thorax, and last abdominal annuli covered with thick hairs of a glossy golden-yellow; elytra cinereous-grey, with a black base; under part of the body bluish-black. North of Europe, France and Germany.

S. olens, Fab., Panz. ib., XXVII, 1. An inch long; dead black; head wider than the body; wings reddish. Its ova are remarkably large. Very common in the environs of Paris, under stones.

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(1) Add *O. maxillosus*, Fab.; Panz. Ib. 20. The remaining Oxypori of Fabricius belong to subgenera of our fourth section. See Oliv., Encyc. Méthod., genus *Oxypore*, and the Coleoptera Microptera, Gravenhorst.

(2) *Staphylinus ulmi*, Oliv.; Ross., Faun. Etrusc., I, v, 6; Panz. Ib., LXXXVIII, 4; Latr., Gener. Crust. et Insect., I, 284.

S. maxillosus, L.; Panz. ib. 2. About eight lines in length; black; glossy; head wider than the thorax; great part of the abdomen and elytra cinereous grey, dotted and spotted with black. In earth, dung, &c.

S. murinus, Fab.; Panz., ib., LXVI, 16. From four to six lines long; head, thorax and elytra deep bronze, glossy, with dusky spots; scutel yellowish, marked with two atrous spots; abdomen black; greater part of the antennæ reddish. Found with the preceding.

S. erythropterus, L.; Panz., XXVIII, 4. From six to ten lines in length; black; elytra, base of the antennæ and legs fulvous(1).

The others, which are linear, with a head and thorax elongated in the form of a long square, have their antennæ approximated at base, and strongly geniculate and granose; their anterior tarsi are usually not at all or but very slightly dilated. The anterior tibiæ are spinous, with a stout spine at the extremity. The labrum is small. They form the genus *Xantholinus* of some entomologists(2).

Pinophilus, Grav.

Palpi filiform; but the antennæ inserted before the eyes, outside of the labrum, and near the exterior base of the mandibles(3).

Lathrobium, Grav.—*Pæderus*, Fab.

Palpi suddenly terminated by a pointed and frequently indistinct joint, much smaller than the penultimate; those of the maxillæ much longer than the labials; the antennæ inserted as in Pinophilus; anterior tarsi strongly dilated in both sexes; length of the last joint of the four posterior tarsi almost equal to that of the four preceding ones taken together(4).

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(1) See the Monograph of this family—Coleoptera Microptera—by Gravenhorst; Panz., Index, Entom., pars 1, p. 208, et seq.; Lat. ib., I, 285. Refer to this genus the following species of Olivier: *aureus*, *æneus*, *hæmorrhoidalis*, *oculatus*, *erythrocephalus*, *similis*, *cyaneus*, *pubescens*, *cupreus*, *stercorarius*, *brunnipes*, *pilosus*, *politus*, *amœnus*, besides those above described.

(2) The Staphylini *fulgidus*, *fulmineus*, *pyropterus*, *elegans*, *elongatus*, *ochraceus*, *alternans*, *melanocephalus*, Gravenhorst.

(3) *Pinophilus latipes*, Grav., North America. In his *Mantissa* it is united to the following genus.

(4) See Gravenhorst, Coleop. Microp., and Lat. Gener. Crust. et Insect., I, 289.

In the second section, that of the Longipalpi, where the head is also completely exposed, but the labrum entire, the maxillary palpi are nearly as long as the head, and have a clavate termination formed by the third joint, with the fourth concealed or but slightly visible, and in the figure of a small point, terminating the club when apparent; the preceding joint considerably enlarged. These Insects live along the shores of rivers, &c.

Pæderus, Fab.

The antennæ inserted before the eyes, either filiform or gradually increasing in thickness, and longer than the head; body long and narrow; mandibles dentated on the internal side, and terminating in a simple point.

In some of them, Pæderus, Lat.—the penultimate joint of the tarsi is bifid(1).

> *P. riparius; Staphylinus riparius*, Panz., Faun. Insect. Germ., IX, 2. About three lines in length; very narrow and elongated; fulvous; head, pectus, superior extremity of the abdomen and knees, black; elytra blue. Very common in wet sand, under stones, among the roots of trees, &c.

In the others, Stilici, Lat.—all the joints of the tarsi are entire(2).

Evæsthetus, Grav.

The antennæ also inserted before the eyes, but hardly longer than the head, and almost entirely moniliform; the body but slightly elongated, and the head as wide as the thorax(3).

The *L. elongatum* (*S. elongatus*, L.) is figured by Panz., Ib. IX, 12;—*Staphylinus linearis*? Oliv., Col. III, 2, iv, 38. See also Gyllenh., Insect. Suec. I, pars I, p. 363, et seq., and the Catalogue of Count Dejean, p. 24.

(1) M. Lefèvre has brought an Insect from Sicily allied to Pæderus, but evidently forming a new genus. The fourth and last joint of the maxillary palpi is here very distinct, and gives them a clavate termination. The last joint of the antennæ is ovoido-conical and larger than the penultimate. The head is connected with the thorax by an elongated pedicle, on a level with the former at its origin. The thorax is narrow and elongated. The two anterior tarsi are greatly dilated; the first joint of the others is very long, and their penultimate appeared to me emarginated or bifid. I will distinguish the genus by the name of Procirrus, and this species shall be dedicated to the zealous naturalist who discovered it.

(2) See Latr., Gener. Crust. et Insect., I, p. 290, et seq.; and Gyllenh., Insect. Suec. I, pars II, p. 372.

(3) *Evæsthetus scaber*, Grav.; Germ., Faun. Insect. Europ. VII, 13; Gyll., Ib., p. 461. A new species has been discovered by M. Blondel, Jun. in the vicinity of Versailles.

Stenus, Lat.

The antennæ inserted near the internal margin of the eyes, and terminated in a triarticulated club; extremity of the mandibles forked; large eyes.

S. 2-guttatus; Staphylinus 2-guttatus, L.; Panz. Faun. Insect. Germ., XI, 18. About two lines in length; all black, with a reddish dot on each elytron(1).

The third section—Denticrura, Lat.—differs from the second in the maxillary palpi, which are much shorter than the head, and always consist of four distinct joints; the anterior tibiæ, at least, are dentated or spinous along their exterior side. The last joint of the tarsi, which in most of them are bent under the tibiæ, is as long as all the preceding ones together, or longer; the first, or two first, are usually so small or so concealed that the whole number does not appear to exceed two or three.

The fore-part of the head, and even the thorax, is armed with horns in several males. The antennæ are inserted before the eyes.

Some, whose palpi have a fusiform termination, whose antennæ are mostly granose and gradually enlarge towards the extremity, present but three distinct joints in the tarsi(2).

Oxytelus, Grav.(3)

The others have filiform palpi, and at least four very distinct joints in the tarsi.

Osorius, Leach, Dej.

The body cylindrical; all the tibiæ widened and dentated; the head as long as it is wide; thorax almost cordiform, narrowed and truncated posteriorly; the greater part of the antennæ granose, insensibly enlarging towards the extremity, and shorter than the head and thorax; mandibles much shorter than the head, crossing considerably, and terminating in a simple point; mentum large and scutiform.

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(1) Add *Staphylinus Juno*, Payk.;—*Pæderus proboscideus*, Oliv., Col. III, 44, I, 5;—*Staph. clavicornis*, Panz., Faun. Insect. Germ. XXVII, 2. See Gravenhorst, Coleop. Microp.; Lat., Gener. Crust. et Insect., genus *Stenus*, and Gyll., Ibid. p. 463.

(2) With the exception of the Tachini, the anterior tarsi are no longer remarkably dilated.

(3) See Encyc. Méthod., article Oxytele; the Monog. cit. of Gravenhorst, and the Insect. Suec., Gyll., I, pars II, p. 444.

But a small number of species are known, which are not yet described. From Guiana and Brazil.

ZYROPHORUS, Dalm.—*Leptochirus*, Germ.—*Irenæus*, Leach.—*Oxytelus*, Oliv.—*Piestus*, Grav.

The body depressed; anterior legs only, wider than the rest, dentated exteriorly; head transverse; thorax square; antennæ equal throughout, at least as long as the head and thorax, and composed mostly of oval or cylindrical joints rounded at both ends; mandibles as long as the head, and dentated at the extremity(1).

PROGNATHA, Lat. Blond.—*Siagonum*, Kirby.

The Prognathæ scarcely differ from the Zyrophori except in their filiform antennæ, composed of elongated joints(2).

COPROPHILUS, Lat.—*Omalium*, Grav. Oliv. Gyll.

The body still flattened, but all the tibiæ dentated or spinous exteriorly; antennæ much longer than the head, granose, insensibly enlarging towards the end; mandibles almost lunate, arcuated exteriorly, not sensibly dentated, and their extremity but slightly prolonged(3).

In the fourth section, that of the DEPRESSA, we find a free head, an entire labrum, and short maxillary palpi of four distinct joints; but the tibiæ are simple, or without teeth or spines exteriorly, and the tarsi evidently consist of five joints.

Here the palpi are filiform.

OMALIUM, Grav.

The thorax as wide as the elytra, wider than the head, and almost forming a transverse square; the angles, or at least those before, rounded, and frequently with a raised lateral margin; the antennæ enlarging towards their extremity(4).

LESTEVA, Lat.—*Anthophagus*, Grav.

Thorax cordiform, narrowed, and truncated posteriorly, almost isometrical, as wide as the head, and narrower than the elytra; the antennæ usually filiform, with elongated joints(1).

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(1) See Dalman, Anal. Entom. p. 23; his *Z. fronticornis*, IV, f. 1, appears to be the *Oxytelus bicornis*, Oliv., Encyc. Méthod. The one he calls *penicillatus*, Ib. f. 2, appears to be closely allied to the *Piestus sulcatus*, Gravenhorst. The *Leptochirus*, *scoriaceus*, Germ., Insect. Spec. Nov. I, 1, is a very distinct species.

(2) *Siagonum quadricorne*, Kirby and Spence, Introd. to Entom., I, 1, 5; Blondel, Ann. des Sc. Nat. Avril 1817, XVII, 14—17.

(3) *Omalium rugosum*, Gravenhorst, and other species with short elytra.

(4) See Gravenhorst, Encyc. Méthod., art. *Omalie*, and Gyll., Ib., p. 198.

There the palpi are subulate.

Micropeplus, Lat.

Antennæ terminating in a solid club, and lodged in fossulæ of the thorax(2).

Proteinus, Lat.

Antennæ granose, somewhat perfoliaceous, and larger at the end, but clavate, always exposed, and inserted before the eyes; thorax short; elytra covering the greater part of the abdomen(3).

Aleochara, Grav.

The antennæ inserted between the eyes or near their inferior margin and exposed at base, with the three first joints evidently longer than the following ones, which are perfoliate, the last elongated and conical; thorax nearly oval, or a square rounded at the angles(4).

In the fifth section—Microcephala—the head is plunged posteriorly into the thorax, nearly up to the eyes; it is neither separated by a neck, nor by a visible strangulation; the thorax forms a trapezium, and is widened from before backwards.

The body is less elongated than in the preceding section, and approaches more to an ellipsis; the head is much narrower, contracted and projected forwards, and the mandibles are of a moderate size, edentated, and simply arcuated at the point. The elytra, in several, cover rather more than the half of the length of the top of the abdomen. Some live on flowers and mushrooms, and others in dung. Fabricius placed several species among the Oxypori.

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(1) See Latr., Gener. Crust. et Insect., I, 296, 297; Gravenhorst and Gyllenhal, genus *Anthophagus*.

(2) See Lat. Gener. Crust. et Insect., IV, 377; *Omalium porcatum*, Gyll., Insect. Suec., I, pars II, p. 211; *Micropeplus porcatus*, Charp., Horæ Entom., VIII, 9;—*O. staphylinoides*, Gyll., Ib. p. 213.

(3) See Lat., Ib. I, p. 298, and the *Omal. ovatum* and *macropterum* of Gravenhorst.

(4) *Staphylinus canaliculatus*, Fab.; Panz., Ib., XXVII, 13;—*Staphylinus impressus*, Oliv., Col., Ib., v, 41;—*S. boleti*, L.; Oliv., Col., Ib., iii, 25;—*S. collaris*, ejusd., Ib. vi, 53;—*S. socialis*, ejusd., Ib., iii, 25, and generally the three first families of the genus *Aleochara*, of Gravenhorst, Col. Mic., II. See also Gyllenhal, Insect. Suec. I, pars II, p. 377. We should remark, however, that neither this author nor Gravenhorst has assigned clear and rigorous characters to the Aleocharæ and Lomechusæ; both these genera demand revision.

Lomechusa, Aleochara, Grav.

No spines on the tibiæ; the antennæ, from the fourth joint, forming a perfoliaceous mass, or elongated and fusiform; palpi subulate; antennæ frequently shorter than the head and thorax(1).

Tachinus, Grav.

Tibiæ spinous; antennæ composed of pyriform joints, and insensibly enlarging; palpi filiform(2).

Tachyporus, Grav.

Similar to Tachinus in the tibiæ and antennæ, but the termination of the palpi is subulate(3).

The genus Callicerus, Gravenhorst, is unknown to me. The Stenosthetus of Megerle, mentioned in the Catalogue, &c. of Dejean, presents all the characters of a true Pselaphus, and must be suppressed—such also is now the opinion of this last named naturalist.

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(1) In some, the thorax is smooth and without an elevated margin; such are the Aleocharæ *bipunctata, lanuginosa, nitida* (*Staphylinus bipustulatus*, L.; Oliv., Col., III, 42, v, 44), *fumata, nana*, Gravenh., or his families III—VI, Col. Microp., II. The margin of the thorax is turned up in the others forming his genus *Lomechusa; L. paradoxa; Staphylinus emarginatus*, Oliv., Ib., ii, 12;—*L. dentata*, Grav.; *Staphylinus strumosus*, Payk., V.

(2) *Oxyporus subterraneus*, Fab.;—*O. bipustulatus*, ejusd., Panz., Faun. Insect. Germ., XVI, 21;—*O. marginellus*, Panz., Ib., IX, 13; *Staphylinus fuscipes*, Ib., XXVII, 12;—*Oxyporus suturalis*, Ib., XVIII, 20;—*O. pygmæus*, Ib., 27;—*O. lunulatus*, Ibid., XXII, 19, 15;—*Staphylinus atricapillus*, F.;—*Oxyporus merdarius*, Panz., Ibid., XXVI, 18;—*Staphylinus striatus*, Oliv., Ib., v, 47; *S. lunatus*, L. See also for this, as well as the following subgenus, the Insect. Suec., Gyll., I, pars I. Some excellent remarks will there be found respecting the sexual differences of several species, the application of which may be rendered highly useful.

Those Tachini in which, as in the *atricapillus*, the thorax is nearly as long as it is wide, the muzzle advances, the four posterior tarsi are evidently longer than their respective tibiæ, appear to form a particular division.

(3) *Oxyporus rufipes*, Fab., Panz., Ib., XXVII, 20;—*O. marginatus*, F.; Panz., Ib., 17;—*O. chrysomelinus*, Fab.; Panz., Ib., IX, 14;—*O. analis*, Fab.; Panz., Ib., XXII, 16;—*O. abdominalis*, Fab.

FAMILY III.

SERRICORNES.

In the third family(1) of pentamerous Coleoptera, as in the preceding and following families of the same order, we find but four palpi. The elytra cover the abdomen, which, with some other characters, distinguish the Insects which compose it from the Brachelytra just mentioned. The antennæ, with some exceptions, are equal throughout, or smaller at the extremity, dentated, either like a saw or a comb, or even like a fan, and in this respect are most developed in the males. The penultimate joint of the tarsi is frequently bilobate or bifid. These characters are rarely found in the following family, that of the Clavicornes, to which we arrive by such insensible gradations, that to define its limits rigorously becomes a very difficult matter.

Some, in which the body is always firm and solid, and most commonly oval or elliptical, with partly contractile legs, have the head plunged vertically into the thorax up to the eyes; and the præsternum, or median portion of that thorax, elongated, dilated or reaching to beneath the mouth, usually distinguished on each by a groove in which the antennæ—always short—are lodged, and prolonged posteriorly into a point, which is received into a depression of the anterior extremity of the mesosternum. These anterior legs are at a distance from the anterior extremity of the thorax. They form our first section or that of the STERNOXI.

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(1) The *Silphæ* are the only pentamerous Coleoptera in which, as in the preceding ones, we find an excrementitious apparatus; but it is not binary as in the latter, and the exterior canal opens directly into the rectum, like the urethra of Birds. From these considerations then it would seem that the Silphæ, as well as other Clavicornes, should come directly after the Brachelytra. Other considerations had led me to a similar approximation.—See preface to my Consid. Génér. sur l'Ordre Nat. des Crust., &c.—According to M. Leon Dufour, who has furnished me with these anatomical remarks, the hepatic ducts of the Buprestides and Enterides, or of my Sternoxi, in number, length, and mode of insertion, resemble those of the Carabici. The Lampyrides and Melyrides, also, have but two hepatic vessels, but there are four in Telephorus, Lycus, and Ptinus. Of all the Insects of this (Serricorne) family, whose organization he has investigated, he finds the longest alimentary canal in Malachius, Drilus, and Anobium.

Others, whose head is enclosed posteriorly by the thorax, or at least covered by it at base, but in which the præsternum is not dilated, and does not project anteriorly in the manner of a chin-cloth, nor is usually(1) terminated posteriorly in a point received into a cavity in the mesosternum, and in which the body is most commonly either entirely or partially soft and flexible, constitute our second section, that of the MALACODERMI.

A third and last, that of the XYLOTROGI, will comprise those Serricornes, in which the posterior extremity of the præsternum is not similarly prolonged, but whose head is completely exposed and separated from the thorax by a strangulation or species of neck.

We will divide the *Sternoxi* into two tribes. In the first or that of the BUPRESTIDES, the posterior projection of the præsternum is flattened, and not terminated in a laterally compressed point, that is simply received into a depression or emargination of the mesosternum. The mandibles frequently terminate in an entire point, without any fissure or emargination. The posterior angles of the thorax are either but very slightly or not at all prolonged. The last joint of the palpi is most commonly nearly cylindrical, hardly thicker than the preceding; the others are globular or ovoid. Most of the tarsial segments are generally wide or dilated, and furnished beneath with pellets. These Insects never leap, a character which eminently distinguishes them from those of the following tribe(2): they compose the genus

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(1) The Cebriones are an exception, and approximate, in this respect, to the Elaterides; but the inferior extremity of the præsternum does not advance under the head. The mandibles project, are arcuated and simple; the palpi filiform; the legs non-retractile, and the two anterior ones somewhat removed, at base, from the anterior extremity of the thorax, and closely approximated.

(2) The Insects of this tribe also differ from all others of the family in their tracheæ which are vesicular—in the rest they are tubular. See Obs. Anatom., of M. Leon Dufour.

BUPRESTIS, Lin.

The generic appellation of *Richard*, given to these Coleoptera by Geoffroy, intimates the richness of their livery. Several of the European species, and many that are foreign to that country, besides their size, are remarkable for a brilliant polished gold colour on an emerald ground; in others, an azure blue glistens over the gold, or there is a union of several other metallic colours. Their body, in general, is oval, somewhat wider and obtuse, or truncated before, and narrowed behind from the base of the abdomen, which occupies the greater part of its length. The eyes are oval, and the thorax is short and wide. The scutel small or null. The extremity of the elytra is more or less dentated in many. The legs are short.

They walk very slowly, but fly well in hot and dry weather. When about to be seized, they let themselves fall to the ground. At the posterior extremity of the abdomen of the females is a coriaceous, laminiform, conical appendage, composed of three parts, the last annuli of the abdomen; it is properly an instrument with which they deposit their ova in dry wood, the habitat of their larvæ. Several small species are met with on leaves and flowers; most of the others, however, are found in forests, and wood-yards: they sometimes appear in houses, where they have been transported, in wood, in the state of a larva or chrysalis.

Sometimes the antennæ are at most dentated like a saw. The intermediate joints of the tarsi are in the form of a reversed heart, and the penultimate, at least, is bifid. The palpi are filiform or very little thicker at the end. The jaws are bilobate.

BUPRESTIS, Lin.

In the true Buprestis, the antennæ are of equal thickness throughout and serrated from the third or fourth joint.

Some have no scutel.

B. fasciculata, L.; Oliv., Col. II, 32, IV, 38. About an inch long; ovoid, convex; densely punctured and wrinkled; of a golden or cupreous-green, sometimes dusky, with little tufts of yellowish or reddish hairs; elytra entire. From the Cape of Good Hope, where it is often found in such abundance on the same shrub, that the plant seems loaded with flowers.

B. sternicornis, L.; Oliv., Col., Ib., VI, 52, a. Somewhat larger, and of the same form; green, slightly gilded, and very brilliant; large punctures, ornamented at bottom with whitish scales on the elytra; three teeth at their extremity; poststernum projecting in the form of a horn. The East Indies.

B. chrysis, Fab.; Oliv., Ib., II, 8, VI, 52, 6. Differing from the sternicornis in the elytra, which are chesnut-brown, and without whitish spots.

B. vittata, Fab.; Oliv., Ib. III, 17. Nearly an inch and a half long; narrower and more elongated than the preceding species; depressed; bluish-green; four elevated lines, and a cupreous and golden band on each elytron, the end of which is bidentate. East Indies.

B. ocellata, Fab.; Oliv., Ib. I, 3. Almost similar to the preceding in form and size; a large, yellow, phosphoric spot between two golden ones, on each elytron, which is tridentate at the extremity.

The others are furnished with a scutel.

B. gigas, L.; Oliv., Ib. I, 1. Two inches long; thorax cupreous, mixed with brilliant green, and two large smooth spots of burnished steel; elytra tridentate at the extremity, cupreous in the middle, bronze-green on the margin, with impressed puncta, and elevated lines and rugæ. Cayenne.

B. affinis, Fab.; *B. chrysostigma*, Oliv., Ib., VI, 54. Bronze above, brilliant cupreous beneath; elytra serrated at the point, with three elevated longitudinal lines, and two golden impressions on each. France.

B. viridis, L.; Oliv., Ib., XI, 127. About two lines and a half long; linear; bronze-green; elytra entire and dotted. On the trees in France(1).

Fabricius has separated from the true Buprestides those in which the body is shorter, wider in proportion, and almost triangular; the front concave, thorax transversal and lobate posteriorly; where the tarsi are very short and the pellets broad. The five last joints only of the antennæ here form the teeth of the saw, the preceding ones, with the exception of the two first, being small, almost granose, or obconical; the two first are much stouter. These species compose the genus TRACHYS(2), one of which is

B. minuta, L.; Oliv., Ib., II, 14. Black underneath; cupreous-brown above; middle of the front indented; posterior margin of the thorax sinuous; undulated whitish streaks, formed by transverse hairs, on the elytra. Common on the Hazel, on the leaves of which it feeds.

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(1) Add of the American species of this beautiful and numerous genus the *B. confluenta, lateralis, atropurpureus, 6-guttata, gibbicollis, granulata, viridicornis, geminata, divaricata, longipes, cyanipes, campestris*, &c. &c., for the descriptions of which, see Say's paper on Coleopterous Insects, &c.; Jour. Acad. Nat. Sc. of Philad. III, p. 159, et seq. *Am. Ed.*

(2) See the other species quoted by Fabricius, Syst. Eleut., II, 218; and as to the divisions that are to be established in the genus, see Schœnherr, Insect. Synon.

APHANISTICUS, Lat.

The antennæ suddenly terminated by a clavate, oblong, compressed, and slightly serrated club, formed by the four last joints; last joint of the palpi somewhat thicker and almost oval; space between the eyes excavated as in Trachys.

Two or three species are known, all linear, and very small(1). Sometimes the antennæ are strongly pectinated, on one side, in the males, and deeply securiform in the females; the joints of the tarsi are almost cylindrical and entire, the antennæ terminated by one much thicker than those that precede it, and nearly globular. The jaws terminate in a single lobe.

MELASIS, Oliv.

The body cylindrical, and the posterior angle of the thorax prolonged into an acute tooth, characters, which, like those drawn from the tarsi and palpi, announce that these Insects form the passage from this tribe to the second(2),

Or that of the ELATERIDES, which only differs essentially from the first in the posterior stylet of the præsternum, which terminates in a laterally compressed point, frequently somewhat arcuated and unidentate, that sinks at the will of the animal into a cavity in the pectus, situated immediately above the origin of the second pair of legs; and in the circumstance, that these Insects when placed on their back have the faculty of regaining their original position by bounding upwards. Most of them have mandibles emarginated or cleft at the end, palpi terminated by a triangular or securiform joint, much larger than those which precede it, and the joints of the tarsi entire. This tribe only comprises the genus

ELATER, Lin.

The body is usually narrower and more elongated than that of the

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(1) *Buprestis emarginata*, Fab.; Oliv., Ib. X, 116; Germ., Faun. Insect. Europ., III, 9;—*Bup. lineola*, ejusd., Ib., 10.

(2) *Melasis buprestoides*, Oliv., II, 30, 1, 1;—*Melasis elateroides*, Illig., differing, according to him, from the *Elater buprestoides*, Lin.

Buprestides, and the posterior angles of the thorax are prolonged into a sharp point, in the form of a spine.

The common French name of these Insects is *Scarabées à ressort*, and their Latin one, *Notopeda*, *Elater*. When placed on their back, finding it impossible to regain their natural position on account of the shortness of their legs, they bound perpendicularly upwards until they fall on their feet. To execute this motion, they press the latter close to the body, lower their head and thorax, which has a free downward motion, then approximating this last to the postpectus, they forcibly press the point of the præsternum against the margin of the hole situated before the mesosternum, into which it sinks suddenly, as if by a spring. The thorax and its lateral points, the head and elytra, being violently propelled against the plane of position, particularly if it be solid and smooth, concur by their elasticity in causing the body to bound upwards. The sides of the præsternum are distinguished by a groove, where the antennæ, which are pectinated or bearded in several males, are partly lodged. The females have a species of elongated ovipositor with two lateral pieces pointed at the end, between which is the true oviduct.

The Elaterides are found on flowers, plants, and even on the ground; they lower their head in walking, and if any one approaches let themselves fall, pressing their legs against their body.

De Geer has described the larva of a species (*undulatus*) of this genus. It is long, almost cylindrical, and provided with small antennæ, palpi, and six feet; it consists of twelve annuli, covered with a scaly skin, that of the posterior extremity forming a plate with an elevated and angular margin, with two blunt points curved inwards; underneath is a large fleshy and retractile mammilla, which performs the duty of a foot. It inhabits the debris of rotten wood, and is also found in the earth. It even appears that the larvæ of the *E. striatus*, Fab., attack the roots of the Wheat, and, where they exist in great numbers, do much injury to it.

The stomach of the Elaterides is long, transversely rugose, and its posterior portion sometimes inflated; their intestine is moderate.

The various subgenera of this tribe may be referred to two principal divisions. Those where the antennæ can be entirely received into the inferior cavities of the thorax constitute the first.

Sometimes they are received, on each side, into a longitudinal groove, situated directly under the lateral edges of the thorax, and are always filiform and simply serrated. The joints of the tarsi are always entire, without prolongations, and in the form of a palette underneath. The thorax is convex or arched, at least on the sides, and dilates at the posterior angles in the manner of a lobe, pointed or triangular. These Insects approach the Buprestides.

GALBA, Lat.

Mandibles terminating in a simple point; maxillæ unilobulate; last joint of the palpi globular; the body almost cylindrical(1).

EUCNEMIS, Arh.

Mandibles bifid; maxillæ bilobate; last joint of the palpi nearly securiform, and the body almost elliptical(2).

At other times the antennæ, occasionally clavate, are received, at least partially, either into the longitudinal grooves of the lateral borders of the præsternum, or into fossulæ situated under the posterior angles of the thorax. The tarsi are frequently provided with little palettes formed by the prolongation of the inferior pellets, or the penultimate joint is bifid.

Some, with filiform antennæ, have the joints of the tarsi entire and without palettes underneath; the anterior legs, when contracted, are received into lateral cavities in the inferior surface of the thorax. Such is the

ADELOCERA, Lat.(3)

Others, with antennæ also of equal thickness throughout, have the joints of the tarsi entire, but the inferior pellets prolonged or projecting in the manner of little palettes or lobes. Their head is exposed. They form the

LISSOMUS, Dalm.—*Lissodes*, Lat.—*Drapetes*, Meg. Dej.(4)

Others again have equally filiform antennæ, but their second and third joints are flattened, larger than the following ones, and are

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(1) I have seen three species, all from Brazil. One of them has many points of resemblance to the *Melasis tuberculata*, Dalman—Anal. Entom. The maxillæ terminate in a very small and pointed lobe.

(2) Count Mannerheim has published a splendid Monograph of this subgenus, an extract from which, with the plates, is found in the third volume of the Annales des Sciences Naturelles, accompanied by some observations from myself on the too great extent given to the subgenus by that author. The species he calls the *capucinus* is in my opinion the only one that belongs to it, and such was the original idea of him who established it.

(3) *Elater ovalis*, Germ.;—*Elater fuscus*, Fab., and some others from the East Indies, collected there by M. de Labillardière.

(4) Dalm., Ephem. Entom., 1824. His *Lissomus punctulatus* is closely allied to the *Drapetes castaneus* of Count Dejean, and the *Elater lævigatus* of Fabricius.

One species of this subgenus is found in Europe, the *Elater equestris*, Fab.; Panz., Faun. Insect. Germ., XXXI, 21.

N.B Messrs Lepelletier and Serville—Encyclop. Méthod., Insect., X, 594—have alone received into the sternal grooves; the tarsi are similar to those of Lissomus; the head is concealed underneath, and as if covered by a semicircular thorax, into which it is plunged. Such is the

Chelonarium, Fab.

The antennæ, when at rest, extend parallel to each other along the pectus; the first and the fourth joint are the smallest of all; the seven following ones are of the same size, and, with the exception of the last, which is ovoid, almost in the form of a reversed cone, and equal. The body is ovoid, and the anterior tibiæ are wider than the others.

All the species known are from South America(1).

The last subgenus of this first division, or

Throscus, Lat.—*Trixagus*, Kugl. Gyll.—*Elater*, Lin.

Is distinguished from all others of this tribe by the antennæ, which terminate in a triarticulated club, and are lodged in a lateral and inferior cavity of the thorax. The penultimate joint of the tarsi is bifid, and the point of the mandibles entire(2).

Our second division of this tribe will include all the Elaterides whose antennæ are exterior or exposed.

We will separate, in the first place, those in which the last joint of the palpi, of the maxillaries particularly, is much larger than the preceding ones, and almost securiform.

A single subgenus, the

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formed a little group, with various species of Elater, composed of three genera, and characterized by the presence of the elongated and lobe-like pellets with which the inferior surface of the four first joints of the tarsi are furnished. The first of these genera, Lissode, or the Lissomus, Dalm., is distinguished from the two others by the antennæ which are closely approximated at base; in the others they are remote. Those of the genus Tetralobus are flabelliform in the males. In the third or Pericallus, they are simply serrated in both sexes. The *Elater flabellicornis*, Fab., belongs to the first, and consequently this genus is a division of that which I have named Hemirhipus. The Elaterides *ligneus*, *suturalis*, *furcatus*, &c., Fab., belong to *Pericallus*, which will then comprise all the species of my Ctenicera, whose tarsi present the general character above mentioned.

(1) Fab., Syst. Eleut., I, 101; Lat., Gener. Crust. et Insect., I, viii, 7, and II, 44; Dalm., Ephem. Entom., 1824, p. 29. [This genus is also found in the southern section of North America, where however it is very rare. The *S. Lecontei*, Dej., now in my cabinet, is perhaps the only specimen known in the United States. *Am. Ed.*]

(2) *Elater dermestoides*, L.; *E. clavicornis*, Oliv., Coll. II, 31, VIII, 85, a, h; *Dermestes adstrictor*, Fab.; Panz., Faun. Insect. Germ. LXXV, 15. Its larva inhabits oak wood.

Cerophytum, Lat.,

Is removed from the others by the tarsi, of which the four first joints are short and triangular, and the penultimate is bifid.

The antennæ of the males are ramous on the inner side, the base of the third joint and of the following ones being extended into a widened branch rounded at the extremity; those of the females are serrated(1).

In all the other subgenera the joints of the tarsi are almost cylindrical and entire.

Sometimes the head is plunged into the thorax up to the eyes; the anterior extremity of the præsternum projects under the head, and its margin is arcuated.

In some, the labrum and mandibles are concealed by the anterior extremity of the præsternum, the clypeus or epistoma being widened and laid over it. Such is the

Cryptostoma, Dej.—*Elater*, Fab.

In which the internal angle of the summit of the third joint of the antennæ and of the seven following ones is prolonged into a tooth; the second and fourth joints are shorter, the last is long and narrow, and there is a straight linear branch on the inner side of the third, near its origin.

The mandibles are unidentated under the point. The maxillæ present but a single lobe, and are small and membranous, as is also the ligula. The palpi are very short. The tarsi are small, thin, and almost setaceous.

> The only species known, the *Elater denticornis*, Fab., is found in Cayenne, whence it was sent to the Mus. d'Hist. Nat. of Paris by M. Banon.

Nematodes, Lat.

First joint of the antennæ elongated, and the five following ones forming reversed cones, equal, the first or second of this number excepted, which is somewhat shorter, and the five last thicker and almost perfoliate; terminal joint ovoid.

The body is almost linear(2).

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(1) Lat., Gener. Crust. et Insect., IV, 375. The *Malasis sphondyloides*, Germ., Faun. Insect. Eur., XI, 5, is closely allied to the female of the species which is the type of the subgenus. The *Melasis picea*, Palisot de Beauvois, Insect. d'Afr., et d'Amer., VII, 1, has also some analogy to the Cerophyta.

(2) *Eunemis filum*, Manner.

Now the mandibles and labrum are exposed.

Here the antennæ of the males have a flabelliform termination. They form the

HEMIRHIPUS, Lat.

Of which all the species are foreign to Europe(1).

There, these organs, in the same sex, are longitudinally pectinated.

CTENICERA, Lat.(2)

In the following subgenus or

ELATER, properly so called,

The antennæ of the males are simply serrated(3).

E. noctilucus, L.; *Taupin cucujo*, Oliv., Col., II, 2, 31, 11, 14, a. Rather more than an inch long; dusky-brown, with a cinereous down; a convex, yellow, round, shining spot on each side of the thorax near its posterior angles; elytra marked with lines of small punctures. From South America.

During the night, the thoracic spots diffuse a very strong light, sufficiently bright to enable one to read the smallest character, particularly if several of the Insects be placed in the same vase. By it also the women of the country pursue their work, and Ladies even use it as an ornament, placing it in their hair during the evening paseo. The Indians fix them to their feet to light them in their nocturnal journeys. Brown pretends that all the internal parts of the Insect are luminous, and that it has the power of suspending, ad libitum, its phosphoric property(4). The French colonists call it *Mouche lumineuse*, and the Indians, *Cucuyos*, *Coyouyou*, whence the Spanish term *Cucujo*. An individual of this species, accidentally transported to Paris in some wood, in its larva or pupa state, completed its metamorphosis there, and greatly astonished the inhabitants of the faubourg Saint-Antoine by its, to them, extraordinary light.

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(1) *Elater flabellicornis*, Fab.;—*E. fascicularis*, Id., &c.

(2) The *Elat. pectinicornis*, *cupreus*, *hæmatodes*, Fab.;—the *Taupin double-croix*, Cuv., Règn. Anim. IV, xiv, 3.

(3) The anterior extremity of the head is sometimes on a level with the labrum, or on the same horizontal plane; at others it is more elevated, and terminated suddenly; but these differences, frequently imperceptible, cannot be used to establish generic sections—my genus *Ludia* requires a re-examination.

(4) M. de la Cordaire who has examined the living Insect informs me that the principal reservoir of the phosphoric matter is situated inferiorly near the junction of the thorax with the abdomen.

E. æneus, L.; Oliv., Col., Ib., viii, 83. Six lines long, bronze green; glossy; elytra striated; legs fulvous. Germany and the North of Europe.

E. germanus, L.; Oliv., Ib., 11, 12. Very common in the vicinity of Paris, and only differing from the æneus in the colour of its feet, which are black.

E. cruciatus, Oliv., Ib. IV, 40. A pretty European species, with the appearance of the æneus, but smaller; black; two longitudinal red bands on the thorax, near the lateral margin; elytra yellowish-red, with a black line near the anterior angles of their base and two bands of the same colour forming a cross on the suture. Rare near Paris.

E. castaneus, L.; Oliv., Ib. III, 25; v, 51. Black; thorax covered with a reddish down; elytra yellowish with a black extremity; antennæ of the male pectiniform. Europe.

E. ruficollis, L.; Oliv., Ib., VI, 61, a, b. Three lines in length, and of a shining black; posterior half of the thorax red. North of Europe.

E. ferrugineus, L.; Oliv., Ib., III, 35. Ten lines in length; black; the thorax, its posterior margin excepted, and the elytra deep blood-red. On the Willow. The largest species in Europe(1).

Sometimes the head is free posteriorly, or is not sunk to the eyes, which are protuberant and globular. The antennæ are inserted under the edge of a frontal projection, depressed and arcuated anteriorly. The body is long and narrow, or nearly linear. Such are those which form the subgenus

Campylus, Fisch.—*Exophthalmus*, Lat.—*Hammionus*, Mühfeld(2).

Elaterides with filiform palpi and antennæ, pectinated from the fourth joint, will compose a last subgenus, that of

Phyllocerus(3).

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(1) For the remaining species, see Oliv., Ib.; Panz. Faun. Insect. Germ., and his Ind. Entom.; Herbst., Col., and Palisot de Beauvois, Insect. d'Afr. et d'Amér. The genus of Dima of M. Ziegler, a species of which, called *elateroides*, has been figured by M. Charpentier in his Horæ Entomol., VI, 8, presents no character by which I can clearly distinguish it from the preceding one.

(2) See Fischer, Entom. Russ., II, p. 153. This subgenus comprises the *Elater linearis*, L., of which his *mesomelas* is a mere variety; the *E. borealis*, Gyll., and his *E. cinctus*.

(3) Count Dejean having collected but a single specimen, I could not dissect

Our second section, or that of the MALACODERMI is divided into five tribes. In the first, or the CEBRIONITES, so named from the genus Cebrio of Olivier, on which all the others depend, the mandibles terminate in a simple or entire point, the palpi are of equal thickness or more slender at the extremity, the body is rounded and convex in some, oval or oblong, but arcuated above, and inclined anteriorly in others. It is usually soft and flexible; the thorax is transversal, widest at base, and its lateral angles acute, or in several even prolonged into spines. The antennæ are generally longer than the head and thorax. The legs are not contractile.

Their habits are unknown. Many of them are found on plants in aquatic localities. They may all be united in one genus, that of

CEBRIO, Oliv. Fab.

Some, which establish a connection between this and the preceding tribe, which are even of as firm and solid a consistence as the Sternoxi, whose legs are never fitted for leaping, and whose body is generally an oblong oval, with the antennæ of the males either pectinated, flabellated, or serrated, the palpi filiform or somewhat longer at the extremity, and the posterior angles of the thorax prolonged into an acute point, present mandibles projecting beyond the labrum, narrow, and highly arcuated or in the form of hooks. The labrum is usually very short, and emarginated or bilobate.

There, as in the Elaterides, the præsternum terminates posteriorly in a point, received into a cavity in the mesosternum.

The antennæ, which in the males of some species are long, are composed of eleven pectinated or serrated joints. The last joint of the palpi is almost cylindrical or forms a reversed cone.

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it, and therefore was unable to study its characters in detail. Two Insects from Java present a similar appearance, only here, and probably in the females, the antennæ are simply serrated. The mandibles appeared to me to terminate in an entire or edentated point. The last joint of the palpi is somewhat larger and almost obconical. If the mandibles of the Phylloceri be similar, these exotic species must be their congeners.

Of the numerous and beautiful species of Elaterides, proper to the United States, we will merely name the *E. areolatus, dorsalis, bellus, recticollis, obesus, erytropus, oculatus, myops, convexa, triangularis, mancus, basilaris, auripilis, abbreviata, bisectus, rubricollis*, &c., &c., &c. See Say's paper on Coleop. Insects, &c. Jour. Ac. Nat. Sc. of Philad. III, p. 167, et seq. *Am. Ed.*

PHYSODACTYLUS, Fisch.

An orbicular membranous pellet (sole or planta) on the inferior surface of the three intermediate joints of the tarsi; the posterior thighs enlarged; the antennæ, at least in one of the sexes, very short, serrated, and insensibly diminished towards the extremity.

This subgenus has been established by the celebrated author of the Entomographia Imperii Russici, on an Insect from North America, the *P. Henningii*, Letter on the Physodactylus, Moscow, 1824, Ann. des Sc. Nat. Dec. 1824, XXVII, B.

CEBRIO, Oliv. Fab.

In Cebrio proper, all the joints of the tarsi are entire and without pellets, and the posterior thighs are not larger than the others.

The species peculiar to Europe appear in great numbers after heavy rains. The female(1) of the best known species—*C. gigas*, Fab.; *C. longicornis*, Oliv., Col. II, 30, bis, I, 1, a, b, c; Taupin, I, 1, a, b, c,—differs greatly from the male; the antennæ are hardly longer than the head, and the first joint is much longer than the others; the fourth and following ones united form a little oblong and almost perfoliaceous mass. The wings are partly abortive. The legs are shorter, but stouter in proportion, than those of the male. The larva probably lives in the earth.

The *C. bicolor*, Fab.(2), and some other American species, in which the body is elongated, less arcuated above or almost straight, and with shorter antennæ, appear to Dr Leach to constitute a new generic section(3).

Here the præsternum is not prolonged into a point, and there is no anterior cavity in the mesosternum.

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(1) *Cebrio brevicornis*, Oliv., Col. II, 30, bis, I, 2, a, b, c; *Tenebrio dubius*, Rossi, Faun. Etrusc. I, 1, 2. This female, on account of her antennæ, appeared to me to form a new genus which I accordingly established under the name of *Hammonia*. A species is found at the Cape of Good Hope, each joint of whose antennæ throws out a long and linear branch from the base of its internal side, and whose palpi terminate in an ovoid joint, and not in the form of a reversed cone, as in the other species. This latter may be separated from them.

(2) Palisot de Beauvois, Insect. d'Afr. et d'Am., I; 1, 2, a, b.

(3) The *Ceb. fuscus* and *ruficollis*, Fab., have the form of the species he calls the *gigas*. The second was brought from Sicily by M. Lefévre. The *Cebrio femoratus*, of Germar, does not belong to the genus *Anelastes* of Kirby, as I once supposed.

Sometimes all the joints of the tarsi are entire, and without a projecting membranous palette underneath.

ANELASTES, Kirby.

The antennæ remote at base, short, almost granose, with the last joint(1) nearly crescent-shaped; last joint of the palpi almost in the form of a reversed cone.

A. Drurii, Kirb., Lin. Trans., XII, xxi, 2. The only species quoted.

CALLIRHIPIS, Lat.

The antennæ closely approximated at base, inserted on an eminence, and from the third joint, in the males, forming a large fan; the last of the palpi ovoid, the same of the tarsi almost as long as all the others taken together, and presenting between its crotchets a little silky and linear appendage.

The species which is the type of the subgenus—*C. Dejeanii*—is found in Java, and was sent to the Museum of Paris by M. Diard and the late M. Duvaucel. The antennæ consist of but eleven joints, and in that differ from those of the Rhipiceræ, which have the same form, but are composed of more joints in individuals of the same sex, or the males.

Sometimes the inferior surface of the tarsi is furnished with membranous palettes, or their penultimate joint is profoundly bilobate. In the two following subgenera, the inferior surface of each of the four first joints of the tarsi presents two membranous and projecting lobes; the last is long, and terminated between the crotchets by a little silky appendage. The antennæ of some are composed of more than eleven joints, and are flabelliform; those of the others consist of eleven, and are serrated, the four last larger, and forming a club.

SANDALUS, Knoch.

The antennæ, at least those of the females, only a little longer than the head and consisting of eleven joints, the third, and with the exception of the last, the following ones serriform, the four last somewhat more dilated, forming a club; the terminal joint almost ovoid or rounded, or very obtuse at the end(2).

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(1) The third is longer than the preceding and following one, whilst in Cebrio, this joint and the second are shorter than the fourth and following ones. These organs, like those of the Elaterides, seem to be composed of twelve joints, the eleventh being suddenly contracted near the extremity, and terminated by a point having the appearance of a little conical or triangular joint.

(2) *Sandalus petrophya*, Knoch, N. Beyt., I, p. 131, v, 5;—*S. niger*, Id. Ib.

RHIPICERA, Lat. Kirby.—*Ptyocerus*, Hoff.—*Polytomus*, Dalm.

The antennæ flabelliform in both sexes, and composed of numerous joints (from twenty to forty), but fewer in the females.

This subgenus consists of five or six species, two of which are from New Holland, and the remainder from America(1).

The three first joints of the tarsi in the two following subgenera are in the form of a reversed heart, and have no membranous prolongation underneath; the fourth is deeply bilobate; the last, but slightly elongated, exhibits no projecting and silky appendage between its crotchets. The antennæ are filiform, simple, or at most pectinated, and never consist of more than eleven joints.

PTILODACTYLA, Illig.—*Pyrochroa*, De Geer.

Distinguished by the semi-pectinated, or serrated antennæ of the males.

The species of this subgenus are peculiar to America(2).

DASCILLUS, Lat.—*Atopa*, Fab.

Only differs from Ptilodactyla in the antennæ, which are simple in both sexes(3).

The remaining Cebrionites have small mandibles which project but little, or not at all, beyond the labrum, a generally soft and almost hemispherical or ovoid body, and palpi terminating in a point. The antennæ are simple, or but slightly dentated. The posterior legs of several are fitted for leaping. They live on aquatic plants.

In these, the penultimate joint of the tarsi is bilobate. The second and third of the antennæ are shorter than the fourth.

ELODES, Lat.—*Cyphon*, Fab. Dej.

The posterior thighs differing but little in thickness from those of the preceding subgenus(4).

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(1) *Rhipicera marginata*, Lat., Cuv., Règn. Anim. III; Kirby, Lin. Trans., XII, xxi, 3;—*Polytomus marginatus*, Dalm., Anal. Entom. p. 22;—*P. femoratus*, Id. Ib. 21;—*P. mystacinus*, Id. Ib. 22; *Hispa mystacina*, Fab.; Drur. Ins. III, viii, 7. I have seen another species in the collection of Count Dejean, entirely fulvous, sent to him from America by Major Le Conte.

(2) *Ptylodactyla elaterina*, Illig.; *Pyrochroa nitida*, De Geer, Ins., V, xiii, 6—17.

(3) *Atopa cervina*, Fab.; *A. cinerea*, var, Id.; *Ptinus testaceo-villosus*, De Geer, IV, ix, 8; *Cistela cervina*, Oliv., Col., III, 54, 1, 2, a.

(4) The first division of CYPHON, Fab.

SCYRTES, Lat.—*Cyphon*, Fab.

Thighs of the posterior legs very large, and the tibiæ terminated by two stout spurs, one of which is very long, a circumstance which enables these Insects to leap. The labial palpi are forked, and the first joint of the posterior tarsi is as long as all the others taken together(1).

In those, all the joints of the tarsi are entire.

NYCTEUS, Lat.—*Hamaxobium*, Zieg.—*Eucynetus*, Schüp.

The third joint of the antennæ very small, and much shorter than the second and following one, the last almost granose; the four tibiæ terminated by two very distinct spurs; the tarsi long, and more slender towards the extremity(2).

EUBRIA, Zieg. Dej.

The antennæ slightly serrated, the second joint very small, the two following ones largest of all, and the last somewhat emarginate at the end, and tapering to a point; spurs of the tibiæ very small, or nearly null; tarsi filiform(3).

The second tribe of the Malacodermi, or that of the LAMPYRIDES, is distinguished from the first by the enlarged termination of the palpi, or at least those of the maxillæ, by their always soft, straight, depressed, or but slightly convex body, and by the thorax, sometimes semicircular, and at others nearly square or trapezoidal, that projects over the head, which it either entirely or partially covers. The mandibles are usually small, and terminate in a slender, arcuated, very acute point, that is generally entire. The penultimate joint of the tarsi is always bilobate, and the crotchets of the last have neither dentations nor appendages.

The females of some are apterous, or have but very short elytra.

When seized, these Insects press their feet and antennæ against their body, and remain as motionless as if they were dead. Several, thus situated, curve their abdomen underneath. They comprise the genus

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(1) The second division of *Cyphon*, Fab. See the Catalogue, &c. of Dejean.

(2) *Eucynetus hæmorrhoidalis*, Germ., Faun. Insect. Europ. V, ii. See Catal., &c., Dej.

(3) *Cyphon palustris*, Germ., Ib. IV, 3.

LAMPYRIS, Lin.

Antennæ closely approximated at base, the head either exposed and prolonged anteriorly in the manner of a snout, or for the greater part, or entirely, concealed under the thorax; eyes of the males large and globular; mouth small. Such are the characters of a first division of this tribe, which we will subdivide into those in which neither sex is phosphorescent, and those in which the females at least are possessed of that faculty. Both sexes of the former are provided with wings, have their head exposed, and frequently narrower and extended anteriorly, or in the form of a snout, and the thorax widened posteriorly with pointed lateral angles. The two or three ultimate annuli of their abdomen are destitute of that pale yellowish or whitish tint, that is always found on this part of the body in the true Lampyrides, and which announces their phosphorescence. The elytra, in several, widen behind, and are sometimes strongly dilated and rounded posteriorly, in the females particularly. They are densely punctured, and frequently reticulated.

LYCUS, Fab. Oliv.—*Cantharis*, Lin.

We restrict this subgenus to those species of Fabricius, in which the snout is as long as the portion of the head that precedes it, or longer, and the antennæ are serrated. The elytra are most commonly dilated, either laterally, or at their posterior extremity, the two sexes differing greatly in this respect, particularly of certain species peculiar to Africa(1).

Other species of the same author, but with very short snouts, and whose compressed antennæ, sometimes simple, and at others serrated or pectinated, have their third joint longer than the preceding one, and in which the intermediate joints of the tarsi have the form of a reversed heart, compose a second subgenus, the

DICTYOPTERA, Lat.

In some of the woods in the vicinity of Paris, on the flowers of the Yarrow, and of other plants, we frequently observe the

Lycus sanguineus; *Lampyris sanguinea*, L.; Panz., Faun. Insect. Germ. XLI, 9. About three lines in length; black; sides of the thorax and the elytra blood-red; elytra silky and slightly striated. The larva lives under the bark of the Oak. It is linear, flattened, and black, the last ring red, resembling a plate with two kinds of horns, cylindrical, and, as it were, annulated or articulated, and arcuated inwards. It has six small feet.

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(1) The *Lyc. latissimus, rostratus, proboscideus*, &c., of Fabricius. For the other species, see Schœnherr, Synon. Ins., I, pars III, App., where several are described and figured.

Lycus minutus, Fab.; Panz., Faun. Insect. Germ., XLI, 2. Smaller; all black, the extremity of the elytra excepted, which is red, and the end of the antennæ, which is reddish. Also found in France, but in forests of the mountain Fir(1).

Omalisus, Geoff. Oliv. Fab.

No apparent snout; joints of the antennæ almost cylindrical, slightly reduced at base, and the second and third much shorter than the following ones; penultimate joint of the tarsi alone in the form of a reversed heart; the others elongated and cylindrical; elytra tolerably solid and firm.

O. suturalis, Fab.; Oliv., Col. II, 24, 1, 2. Rather more than two lines in length, black, elytra blood-red, the suture excepted. Found in the woods in the vicinity of Paris, and in the forest of Saint-Germain particularly, on the Oaks, in spring(2).

The other Lampyrides of our first division are distinguished from the preceding ones, not only by the want of a snout, by their head, which, in the males almost entirely occupied by the eyes, is entirely or for the greater part concealed under a semicircular or square thorax, but also by a very remarkable character, either common to both sexes, or peculiar to the females, that of being phosphorescent, whence the names of glow-worms, fire-flies, &c., given to these Insects.

Their body is extremely soft, the abdomen particularly, which has the appearance of being plaited. The luminous matter occupies the inferior part of the last two or three annuli, which differ in colour from the rest, and are usually yellowish or whitish. The light they diffuse is more or less vivid, and greenish or whitish, like that of the different kinds of phosphorus. It seems that they can vary its action at pleasure, a fact particularly observable when they are seized or held in the hand. They live a long time in vacuum and in different gases, the nitrous acid, muriatic and sulphurous gases excepted, in which they soon expire. Placed in hydrogen gas, they, sometimes at least, detonate. They continue to live after the excision of this luminous portion of their abdomen, and the part thus separated preserves its luminous property for some time, whether it be submitted to the action of various gases, be placed in vacuum, or left exposed to the air. The phosphorescence depends on the softness of the matter, rather than on the life of the animal. When apparently extinct it may be reproduced by softening the matter with water. The Lampyrides emit a brilliant light when immersed in warm water, but in cold water it becomes extinguished: this fluid seems to be the only dissolving agent of the phosphoric matter(1).

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(1) The *Lyc. reticulatus, bicolor, serraticornis, fasciatus, aurora,* &c.

(2) See Encyc. Méthod., article *Omalise.*

They are nocturnal Insects; the males, like Phalenæ of the same sex, are frequently observed circling round the blaze of candles, &c., from which we may conclude, that this phosphoric light, which is chiefly given out by the females, is intended to attract the former to the latter: and if, as De Geer asserts, the larvæ and pupæ of the species found in France are luminous, we are only to conclude that the phosphoric matter is developed at the earliest period of their existence. It has been said that some males were destitute of this luminous property—but they still possess it though in a very small degree. As nearly all the Lampyrides of hot climates, males as well as females, are provided with wings and are extremely numerous, they present to their inhabitants at night an interesting spectacle, a continued illumination, proceeding from the myriads of luminous points which like little wandering stars traverse the air in every direction.

According to M. Dufour—Ann. des Sc. Nat., III, p. 225—the alimentary canal of the female of the common European Lampyris, the *splendidula*, is about twice the length of the body. The œsophagus is extremely short and immediately dilated into an abbreviated crop separated from the chylific ventricle by a valvular strangulation. The latter is very long, smooth, turgid and cylindrical for two thirds of its length, then intestiniform. The small intestine is very short and flexuous, presenting an enlargement (perhaps not constant) representing a cæcum, and terminated in an elongated rectum.

Certain Brazilian species, in which the antennæ of the males consist of more than eleven joints formed like the laminæ of a feather, have been separated from the genus Lampyris of Linnæus. They constitute the AMYDETES, Hoff., Germ.(2)

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(1) Besides the experiments detailed in the Ann. de Chimie, see the Ann. Génér. des Sc. Phys., of Messrs Bory de Saint-Vincent, Drapiez et Van Mons. VIII, p. 31, where will be found the researches of M. Grotthuss on the phosphorescence of the *Lampyris italica*.

(2) *Lampyris plumicornis*, Lat., Voy. de MM. Humboldt and Bonpl., Zool. XVI, 4;—*Amydetes apicalis*, Germ., Insect. Spec. Nov., p. 67.

Others, also peculiar to South America, whose antennæ are composed of but eleven joints, present particular characters which have entitled them to the same generic distinction, under the name of PHENGODES, Hoff. The third joint of these organs, and the following ones, give off from the inner side, too long ciliated filaments, which appear to be articulated and convoluted round themselves. The elytra are suddenly narrowed into a point. The wings are extended throughout their entire length, and simply folded longitudinally. The maxillary palpi are very salient and almost filiform. The thorax is transversal. The tarsi are filiform, and their penultimate joint is very short and scarcely bilobate. The body is narrow and elongated, with the head exposed(1).

The other species now form the genus

LAMPYRIS, properly so called,

Which, from the form of the antennæ, the presence or absence of the elytra, wings, &c. is susceptible of several divisions.

L. noctiluca, L.; Panz., Faun., Insect. Germ. XLI, 7. The male about four lines in length; blackish; antennæ simple; thorax semicircular, receiving the entire head, with two transparent lunate spots; venter black; ultimate annuli pale-yellowish.

S. splendidula, L.; Panz., Ib., 8. Closely allied to the preceding, but somewhat larger; thorax yellowish, with a blackish disk and two transparent spots before; elytra blackish; under part of the body and legs livid-yellowish; first annuli of the venter some times of this latter colour, and at others dusky.

The female is destitute of elytra and wings; blackish above; circumference of the thorax and last ring yellowish; lateral angles of the second and third annuli flesh-colour; under part of the body yellowish, with the three last annuli of the colour of sulphur.

These latter individuals are more particularly called *glow-worms*, or *vers luisants*. They are found every where about the country, along the roads, in hedges, meadows, &c. in the months of June, July and August. They lay a great number of lemon-coloured eggs, which are large and spherical, in the ground or on plants, where they are fixed by means of a viscid matter with which they are covered.

The larva bears a great resemblance to the female, but is black, with a reddish spot on the posterior angles of the annuli; its antennæ and legs are shorter. Its gait is very slow, and it has the faculty of elongating and shortening its body, and of bending it underneath. It is probably carnivorous.

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(1) Illig., Mag., VI, p. 342.

L. italica, L.; Oliv., Col. II, 28, 11, 12; the *Lucciola* of the Italians. The thorax does not cover the whole head, is transversal, and as well as the scutel, pectus and one pair of legs reddish; head, elytra and abdomen black; the two last annuli of the body yellowish; wings to both sexes(1).

In our second division of the Lampyrides, the antennæ are very remote at base; the head is neither prolonged nor narrowed anteriorly in the form of a snout, and the eyes are of an ordinary size in both sexes.

Drilus, Oliv.—*Ptilinus*, Geoff. Fab.

The males are winged, and the inner side of the antennæ, from the fourth joint, is prolonged like the tooth of a comb. Those of the females are shorter, somewhat perfoliaceous and slightly serrated. The maxillary palpi in both sexes are thicker towards the end, and terminate in a point. The inner side of the mandibles presents a tooth.

The female of the species which is the type of the genus, and whose male is tolerably common, remained unknown until lately, as well as the metamorphoses of both sexes. Certain observations made at Geneva, by Count Mielzinsky, on the larva of this Insect and the perfect female, excited the attention of two able French naturalists, MM. Desmarest and Victor Audouin. The latter had received from the author of the discovery several living larvæ, which were found in the shell of a *Helix nemoralis* of Linnæus, and which together with the perfect female, the only sex he had obtained in that state, were described by him. But he was mistaken in considering as pupæ, larvæ which had attained their full growth, and which pass the winter in the interior of these shells. In this state, these Insects are tolerably similar to the larvæ of the European Lampyrides, but there are a range of conical mammillæ on each side of their abdomen, and two series of hairy tufts on other elevations of the same nature. The posterior extremity of the body is forked, and the anus is used by the animal as a means of progression. It soon devours the legitimate owner of the shell, whence the generic appellation of Cochleoctonus, given to this Insect by the naturalist above mentioned. M. Desmarest presuming that as these larvæ were common in the neighbourhood of Geneva, they might also be found in the vicinity of Paris, by the aid of his pupils soon procured a number of them, which enabled him to give a complete history of the Insect, and to ascertain that the individuals in their perfect state, described by Mielzinsky, were the females of the *Drile jaunâtre* or the *Panache jaune*, Geoff., I, 1, 2; Oliv., Col. II, 23, 1, 1, the body of which is about three lines long, black, with yellowish elytra. The female is nearly thrice as large, is of an orange or reddish yellow, and resembles that of a Lampyris, but without its phosphorescence. M. Audouin has published its anatomy, and observed that the exuviæ of the larva exactly close the aperture of the shell, forming a sort of operculum. While the animal is in its larva state, it remains at the bottom of its domicil, and so placed, that the posterior extremity of its body faces the opening; when it has passed into that of a pupa its position is inverted. For this observation we are indebted to M. Desmarest(1). M. Dufour has also published some anatomical observations on the male of this species.

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(1) See Fabricius, and Olivier, Col. II, No. 28.

A second, the *D. ater*, Dej., all black, with the antennæ less pectinated, is found in Germany. It is figured, as well as a third, the *ruficollis*, discovered by Count Dejean in Dalmatia, in a Memoir of M. Audouin—Ann. des Sc. Nat., Aout 1824—which, under the title of "Recherches anatomiques sur la femelle du Drile Jaunâtre et sur le mâle de cette espèce," forms a complete Monograph of the genus, enriched with excellent figures.

Both sexes of the remaining Lampyrides of this second division are winged, and their maxillary palpi are not much longer than those of the labium. They embrace a great part of the genus *Cantharis*, Lin., or that of *Cicindela*, Geoff.

TELEPHORUS, Schœff.—*Cantharis*, Lin.

The palpi terminated by a securiform joint; thorax destitute of lateral emarginations. They are carnivorous Insects and run over plants. Their stomach is long and transversely rugose; the intestine very short.

T. fuscus; *Cantharis fusca*, L.; Oliv., Col. II, 26, i, i. From five to six lines in length, posterior part of the head, elytra, pectus and the greater portion of the legs of a slate-black; the other parts yellowish-red; a black spot on the thorax. Is frequently met with in Europe during the spring. The larva is almost cylindrical, elongated, soft, of a dead velvet-black, the antennæ, palpi, and feet yellowish-rufous. The head is squamous and furnished with stout mandibles. There is a mammilla under the twelfth and last annulus which it uses in crawling. It is carnivorous and inhabits moist earth.

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(1) See Ann. des Sc. Nat., Juillet et Aout 1824, and Bullet. de la Soc. Philom., Avril 1824.

During the winter of certain years in Sweden, and even in the mountainous parts of France these larvæ and various other species of living Insects have been observed among the snow in such abundance as to cover a considerable space.

It has been very rationally supposed that they had been swept away and deposited there by those violent gusts of wind which uproot and destroy great numbers of trees, particularly Pines and Firs. Such is the origin of what is termed *a shower of insects.* The species then met with are probably such as appear early in the spring.

T. lividus; Cantharis livida, L.; Oliv., Ib., II, 28. Size and form of the preceding; thorax fuscous and immaculate; elytra yellowish; extremity of the posterior thighs black. On flowers(1).

SILIS, Meg. Dej. Charp.

This subgenus only differs from Telephorus in the thorax, which is emarginated posteriorly on each side, and has underneath—at least in the *S. spinicollis*—a little coriaceous appendage terminated by a club, whose extremity, probably more membranous, in the dried specimen has the appearance of a joint. A species, the *rubricollis*, is figured by M. Toussaint de Charpentier in his Hor. Entom., p. 194, 195, vi, 7.

MALTHINUS, Lat., Schœn.—*Necydalis*, Geoff.

The palpi terminated by an ovoid joint; head narrow behind; elytra, in several, shorter than the abdomen. On flowers, and particularly on trees(2).

In the third tribe of the Malacodermi, or the MELYRIDES, we find the palpi most commonly short and filiform ; mandibles emarginated at the point; the body usually narrow and elongated; the head only covered at base by a flat or but slightly convex thorax, generally square, or elongated and quadrilateral ; joints of the tarsi entire, and the hooks of the last one unidentated or bordered with a membrane. The antennæ are usually serrated, and, in the males of some species, even pectinated.

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(1) For the other species, see Schœnherr, Synon. Insect., II, p. 60, and Panz., Ind. Entom., p. 91.

(2) Lat., Gen. Crust. et Insect., I, 261; Schœnh., Id. II, p. 73; Panz., Id., p.73. The Teleph. *biguttatus* and *minimus* of Olivier belong to this genus.

Most of them are very active, and are found on flowers and leaves.

This tribe, which is a mere division of the genera *Cantharis* and *Dermestes* of Linnæus, will form the genus

MELYRIS, Fab.

In some, the palpi are of equal thickness throughout.

Here, under each anterior angle of the thorax, and on each side of the base of the abdomen, we observe a retractile, dilatable vesicle in the form of a cockade, which is protruded by the animal when alarmed, and whose use is unknown. The body is shorter in proportion than in the following subgenus, wider and more depressed; the thorax wider than it is long. Under each crotchet, at the end of the tarsi, is a membranous appendage resembling a tooth.

MALACHIUS, Fab. Oliv.—*Cantharis*, Lin.

One of the sexes, in each species, furnished with an appendage in the form of a hook, at the extremity of each elytron, which is seized from behind by an individual of the opposite sex, with its mandibles, in order to arrest the former when it attempts to escape, or moves too rapidly. The first joints of the antennæ are frequently dilated and irregular in the males. They are all prettily coloured.

M. æneus; Cantharis ænea, L.; Panz., Ib.; X, 2. Three lines in length; glossy green; margin of the elytra red; head, yellow anteriorly.

M. bipustulatus; Cantharis bipustulata, L.; Panz. Ib., 3. Rather smaller, and of a glossy green; extremity of the elytra red(1).

Among the following Melyrides with filiform palpi, and whose thorax and abdomen are destitute of retractile vesicles, we will first place those the length of whose antennæ at least equals that of the head and thorax, in which the body is generally straight, elongated, and sometimes linear, and the hooks of the tarsi are usually, as in Malachius, bordered inferiorly by a membranous appendage.

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(1) See op. cit. and Schœnh., Synon. Insect., II, p. 67.

DASYTES, Payk. Fab.—*Dermestes*, Lin.

D. cæruleus, Fab.; Panz., Faun. Insect. Germ., XCVI, 10. Three lines in length; elongated; green or bluish; glossy and pilose. Very common near Paris on flowers in the fields.

D. très noir, Oliv., Col. II, 21, ii, 28; *Dermestes hirtus*, L. Somewhat larger and less oblong; all black and densely pilose; a much stouter and strongly hooked spine at the base of the anterior tarsi in one of the two sexes. On the Grasses(1).

Others, the crotchets of whose tarsi are unidentated, like those of Dasytes, to which they are closely allied, and with which Olivier confounds them, are removed from that subgenus by the antennæ being shorter than the head and thorax, and having the third joint at least double the length of the second. Their body is less elongated, and is more solid; the head is slightly prolonged and narrowed before, and the thorax semiorbicular and truncated anteriorly. They have a certain degree of resemblance to the Silphæ of Linnæus. Such are those which form the

ZYGIA, Fab.

In which the fourth and following joints of the antennæ almost form an elongated, compressed, and serrated club; most of the joints transversal; thorax very convex.

Z. oblonga, Fab. Found in Spain and Egypt, in the interior of houses, and more particularly, according to Count Dejean, in granaries. It is also sometimes found in France in the departments of the Pyrénées Orientales. A second species has been discovered in Nubia.

MELYRIS, Fab.

In Melyris, properly so called, the antennæ insensibly enlarge, but without forming a club; their joints are less dilated laterally and are almost isometrical. The thorax is less convex(2).

In the remaining Melyrides the maxillary palpi are terminated by a larger and securiform joint. This character, together with the shortness of the first joint of the tarsi, and some other considerations, seems to approximate them to the Insects of our next tribe. They form the

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(1) For the other species, see Fabricius; the *Mélyres* of Olivier, 6—17; Panz., Ind. Entom. p. 143; Lat., Gener. Crust. et Insect. I, p. 264; Germ., Insect. Spec. Nov. Brazil produces tolerably large ones, some of which form a particular division.

(2) *M. viridis*, Fab.; Oliv., Col. II, 21, i, i;—*M. abdominalis*, Fab.; Oliv., Ib., I, 7; *Opatrum granulatum*, Fab.; Coqueb.; Illust. Icon. Insect., III, xxx, 7.

Pelocophorus, Dej.,

Who arranges them with the tetramerous Coleoptera(1).

The fourth tribe of the Malacodermi, that of the Clerii, is distinguished by the ensemble of the following characters. Two of their palpi at least project and are clavate. The mandibles are dentated. The penultimate joint of the tarsi is bilobate, and the first is very short or but slightly visible in several. The antennæ are sometimes nearly filiform and serrated, and at others insensibly enlarged near the extremity. The body is usually cylindrical, the head and thorax narrower than the abdomen, and the eyes emarginated.

Most of these Insects are found on flowers, the remainder on the trunks of old trees or in dry wood. Such of the larvæ as are known are carnivorous.

This tribe will comprise the genus

Clerus, Geoff.

The tarsi of some, viewed from above and underneath, distinctly exhibit five joints. The greater part of their antennæ is always serrated.

Of these, some have the maxillary palpi filiform, or slightly enlarged near the extremity.

Cylidrus, Lat.

Mandibles long and much crossed, terminating in a simple point, with two teeth on the internal side; four first joints of the antennæ cylindrical and elongated; the six following ones formed like the teeth of a saw, and the last oblong; the palpi terminated by an elongated joint; that of those attached to the maxillæ cylindrical, and the same of the labial palpi, rather thicker and forming a reversed cone; penultimate joint of the tarsi distinctly bilobate. The head is elongated.

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(1) Catalogue, &c., Dej., p. 115; *Notoxus Illigeri*, Schœnh., Synon. Insect., I, 2, p. 53, IV, 7, a. I refer to the same division of Melyrides, a new subgenus which I will call Dielobicerus. The antennæ consist of but ten distinct joints, of which the two last are larger and globular. It is founded on an Insect sent to me by M. Lefébure de Cérisy.

The only species known—*Trichodes cyaneus*, Fab.—inhabits the Isle of France.

Tillus, Oliv., Fab.(1)

Mandibles moderate, cleft or bidentated at the extremity; antennæ sometimes serrated from the fourth joint to the tenth inclusively, with the last ovoid, and at others suddenly terminating, from the sixth, in a serrated club. The last joint of the labial palpi is very large and securiform; head short and rounded; third and fourth joints of the tarsi dilated in the form of a reversed triangle. Found in old wood or on trunks of trees.

In the remaining Insects of this tribe, which are always distinctly pentamerous, the four palpi terminate in a club; the last joint of the labials is almost always securiform.

Here, the four first joints of the tarsi are provided underneath with membranous pellets, projecting in the form of lobes. The thorax is elongated and almost cylindrical.

Priocera, Kirb.

The body convex; thorax narrowed posteriorly; last joint of the maxillary palpi less dilated than that of the labials and in the form of a reversed and oblong triangle; the labrum emarginated.

But a single species is known, the *Priocera variegata*, Kirb., Lin. Trans. XII, p. 389, 390, xxi, 7.

Axina, Kirb.

The body depressed; last joint of the four palpi very large and securiform.

But a single species has yet been described, the *Axina analis*, Kirb., Ib., fig. 6. From Brazil.

There, the penultimate joint of the tarsi is alone distinctly bilobate. The thorax is square. The body is depressed as in Axina, and the palpi terminate as in the same subgenus. Such is

Eurypus, Kirb.

E. rubens, Kirb., Ib., 5, also from Brazil. I have seen a second species of the same country in the splendid collection of M. de la Cordaire.

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(1) *Tillus elongatus*, Oliv., Col. II, 22, 1, 1; *Chrysomela elongata*, L.;—*Clerus unifasciatus*, Fab.; Oliv., IV, 76, ii, 21. The antennæ of the first are serrated from the fourth joint, and the thorax is cylindrical. In the second, the antennæ from the sixth joint terminate in a serrated club. The thorax is narrowed posteriorly. The last joint of the maxillary palpi is longer, in proportion, than that of the first species, and is compressed.

We now come to species in which the tarsi, when viewed from above, appear to consist of but four joints, the first of the usual five being very short and concealed under the second(1).

Sometimes the antennæ insensibly enlarge towards the extremity, or gradually terminate in a club; the intermediate joints, from the third, are nearly in the form of a reversed cone; the two or four penultimate joints form reversed triangles, and the last is ovoid.

Thanasimus, Lat.—*Clerus*, Fab.

The maxillary palpi filiform; last joint of those attached to the labium large and securiform(2).

Opilo, Lat.—*Notoxus*, Fab.

The four palpi terminated by a large securiform joint(3).

Sometimes the three last joints of the antennæ are much wider than the preceding ones, suddenly forming a club, either simple and in the form of a reversed triangle, or serrated.

Those, in which this club is simple or not serrated, form two subgenera.

Clerus, Geoff.—*Trichodes*, Fab.

The maxillary palpi of these Cleri, properly so called, are terminated by a compressed joint in the form of a reversed triangle; the last of those that belong to the labium, which are larger than the others, is securiform. The antennal club is hardly longer than wide, and is composed of crowded joints; the third is longer than the second. The maxillæ terminate in a projecting and fringed lobe. The thorax is depressed anteriorly.

These Insects are found on flowers; their larvæ devour those of certain Bees.

Their stomach is widest anteriorly, and without plicæ; their intestine is short, with two enlargements behind. According to M.

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(1) The Insects of this subdivision compose the genus *Clairon*, properly so called, of Geoffroy; M. Dufour admits that the posterior tarsi consist of five joints, the first of which is very short; the same joint is rudimental in the intermediate tarsi, and wanting in the two that are anterior.

(2) *Attelabus formicarius*, L.; *Clerus formicarius*, Oliv., Col. IV, 76, 1, 13;—*Clerus mutillarius*, Fab.; Oliv., Ib., I, 12.

(3) *Attelabus mollis*, L.; *Clerus mollis*, Oliv., Ib., I, 10.

Dufour, their crop is so short that it is almost entirely concealed in the head(1).

C. apiarius; *Attelabus apiarius*, L.; *Trichodes apiarius*, Fab.; Oliv., Col. IV, 76, 1, 4. Blue; elytra red, traversed by three bands of deep blue, the last of which occupies the extremity. The larva devours that of our domestic Bee, and does much injury to hives.

C. alvearius; *Trichodes alvearius*, Fab.; Oliv., Ib., I, 5, a, b; Reaum., Insect., VI, viii, 8—10. Almost like the preceding, but with a bluish-black spot on the scutel. It inhabits the nests of the *Mason Bees*—Osmia—of Reaumur, and feeds on their larvæ.

Necrobia, Lat.—*Corynetes*, Fab.

The four palpi terminated by an elongated, compressed, triangular joint of the same size; the second and third joints of the antennæ nearly equal, and the terminal club elongated, with loose joints; no depression in the thorax anteriorly.

N. violacea, Oliv., Col., Ib., 76, *bis*, I, 1; *Dermestes violaceus*, L. Small; violet-blue or greenish, with similarly coloured legs; elytra, with longitudinal series of punctures. Very common in houses in the spring; it is also found in carrion(2).

We will terminate this tribe with a subgenus in which the two penultimate joints of the antennæ, more or less dilated internally in the form of teeth, compose with the last, which is oval, a serrated or semipectinated club. The palpi are terminated by a larger joint, either in the form of an elongated or compressed triangle, or securiform. Such are those which form the

Enoplium, Lat.—*Tillus*, Oliv. Fab.—*Corynetes*, Fab.(3)

The type of the fifth tribe of the Malacodermi, or the Ptiniores, consists of the genus *Ptinus* of Linnæus, and of some other genera depending on, or which most closely approach it. The body of these Insects is of a tolerably firm consistence, sometimes almost ovoid or oval, and at others nearly cylindrical, but generally short and rounded at the two extremities. The head is nearly globular or orbicular, and almost entirely received into a strongly arched or vaulted thorax, resembling a hood. The antennæ of some are filiform, or diminished towards the end, and are either simple, flabelliform, pectinated, or serrated; those of others terminate suddenly by three larger and much longer joints. The mandibles are short, thick, and dentated under the point. The palpi are very short and terminated by a larger and almost ovoid joint, or like a reversed triangle. The tibiæ are not dentated, and the spurs at the extremities are very small. There is but little variety in their colours, which are always dark. They are very small. When touched they counterfeit death, lower their heads, incline their antennæ, and contract their feet; in this apparent state of lethargy they remain for some time. Their motions are generally slow, and those that are winged rarely take to flight to escape. Their larvæ are very noxious to us, and bear a great resemblance to those of the Scarabæides. Their body, frequently curved into an arc, is soft and whitish; the head and feet are brown and squamous. Their mandibles are strong. With fragments of various substances, which they detach by gnawing, they construct a shell in which they become nymphs. Other species establish their domicil in the country, in old wood, and under stones; their habits are the same.

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(1) The genital organ of the male is much more complicated than that of the Melyrides, Lampyrides, and other Malacodermi. The last abdominal annulus is widely emarginated. They and the *Peltes* of Fabricius are the only Coleoptera which have six biliary vessels—they are inserted into the cæcum.

(2) See Olivier, genus *Necrobie* and Schœnh., Synon. Insect. I, 2, p. 50.

(3) *Tillus serraticornis*, Oliv., Col. II, 22, 1, 2;—*T. Weberi*, Fab.;—*T. damicornis*, Id.;—*T. dermestoïdes*, Scheff., Elem. Entom., 138;—*Corynetes sanguinicollis*, Fab. See Schœnh., Synon. Insect., I, 2, p. 46.

Such are the characters of the genus

PTINUS, Lin.

In some, the head and thorax, or the anterior half of the body is narrower than the abdomen; the antennæ are always terminated in the same manner, simple or but slightly serrated, and at least almost as long as the body.

PTINUS, Lin., Fab.—*Bruchus*, Geoff.

The antennæ of the true Ptini are inserted between the eyes, which are protuberant or convex. Their body is oblong.

They are generally found in houses, and chiefly in granaries and inhabited places. Their larvæ destroy our herbaria and desiccated specimens of animals. The antennæ of the males are longer than those of the females, and in several species, these latter are apterous.

P. fur, L., Fab.; *P. latro*, *striatus*, F.; Oliv. Col. II, 17, i, 1, 3; ii, 9, var. of the male. One line and a half in length; light brown; antennæ as long as the body; a pointed projection on each side of the thorax, and between them two others, rounded and covered with a yellowish down; two transverse, greyish bands on the elytra, formed by hairs.

According to De Geer, it feeds on Flies and other dead Insects that fall in its way. The larvæ are very injurious to herbaria and other collections of natural history.

P. imperialis, Fab.; Oliv., Ib., I, 4. Remarkable for two spots on the elytra, which, together, form a rude figure of a two-headed Eagle. On old wood(1).

I have frequently found on fecal matters, the *P. germain*, Lat. Gener. Crust. et Insect., I, p. 279, which is closely allied to the *P. fur*(2).

GIBBIUM, Scop.—*Ptinus*, Fab., Oliv.

The antennæ inserted before the eyes, which are flattened and very small; scutellum wanting or indistinct; the body short; abdomen very large, turgid, almost globular and semidiaphanous; the antennæ smaller at the extremity, and the elytra soldered. These Insects also reside in our herbaria, &c.(3)

In the others, the body is oval, ovoid, or nearly cylindrical; the thorax the width of the abdomen, at least at base; the antennæ either uniform and serrated or pectinated, or terminated by three joints much larger than the preceding ones; they are shorter than the body.

PTILINUS, Geoff., Oliv.—*Ptinus*, Lin.

The antennæ from the third joint strongly pectinated or plumose (en panache) in the males, and serrated in the females.

They inhabit dry wood, which they pierce with small holes.

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(1) It appears to me that this species belongs to the genus HEDOBIA of the Catalogue of Dejean. It differs from Ptinus in the antennæ, which are more remote from each other, and slightly serrated, and particularly in the tarsi which are short and composed of wide and almost cordiform joints, the last one particularly; the hooks of the latter are almost always concealed. In Ptinus these tarsi are straight, and their last joint resembles a reversed cone. The antennæ are approximated at base.

(2) For the synonymes of the species of this genus, see Schœnh., Synon. Insect. II, 106.

(3) *Ptinus scotias*, Fab.; Oliv., Col. Ib. I, 2; Panz., Faun. Insect. Germ., V, 8;—*P. sulcatus*, Fab.

There also they copulate, one of the sexes being without and suspended in air(1). In the

Xyletinus, Lat.—*Ptilinus*, Fab.

To which we will unite the Ochina of Ziegler and Dejean, the antennæ are simply serrated in both sexes(2).

Dorcatoma, Herbst., Fab.

The antennæ consisting of but nine joints, terminating suddenly in three larger ones; the two penultimate joints resembling the teeth of a saw(3).

Anobium, Fab., Oliv.—*Ptinus*, Lin.—*Byrrhus*, Geoff.

The antennæ also terminated by three larger or longer joints, but the two penultimates are in the form of a reversed and elongated cone, and that of the end is oval or nearly cylindrical; they consist of eleven joints.

Several species of this genus inhabit the interior of our houses, where, in their larva state, they are very noxious, attacking the timbers, furniture, books, &c. and piercing little round holes in them similar to those made by a very small gimblet. Their excrements form those little pulverulent piles of wood-dust which are frequently observed on floors. The larvæ of other species of Anobium attack flour, wafers, cabinets of Birds, Insects, &c.

Both sexes, in the nuptial season, frequently summon each other by reiterated and rapid strokes of their mandibles against the wood they inhabit, and mutually answering the signal. Such is the cause of that noise, resembling the accelerated tick of a watch, which is so often heard and which is superstitiously called the *death-watch.*

A. tesselatum, Fab.; Oliv., Col. II, 16, i, 1. Three lines in length; dead dusky brown, with yellowish spots formed by hairs; thorax smooth; elytra not striated.

A. pertinax; Ptinus pertinax, L.; *A. striatum*, Fab.; Oliv. Ib. I, 4. Blackish; thorax with a yellowish spot at each posterior angle, and near the middle of its base a compressed eminence divided anteriorly by a depression; elytra with punctured striæ. According to De Geer, it will permit itself to be roasted to death by a slow fire, rather than exhibit the least sign of life when it is seized.

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(1) *Ptilinus pectinicornis*, Fab.; Oliv., Col., II, 17, bis, 1, 1;—*P. pectinatus*, Fab.;—*P. serratus*, Id.; *Ptinus denticornis*, var.; Panz., Ib. VI, 9; XXXV, 9.

(2) *Ptilinus pallens*, Germ.;—*Ptinus serricornis*, Fab. In the *Ochina hederæ*, the antennæ are somewhat larger than those of the Xyletini, rather less serrated, the second and third joints almost equal in length. I have not examined the other species of Ochinæ mentioned by Count Dejean in his Catalogue.

(3) *Dorcatoma dresdensis*, Herbst., Col. IV, xxxix, 8.

A. striatum, Oliv.; *Anobium pertinax*, Fab.; Panz., Ib., LXVI, 5. Very similar to the preceding, but smaller, and destitute of the yellow spots at the posterior angles of the thorax—very common in houses. M. Dufour has observed a number of appendages round its pylorus which form a kind of strawberry.

A. paniceum, Fab.; *A. minutum*, Id.; Oliv. Ib. II, 9. Very small; fulvous; thorax smooth; elytra striated. It gnaws farinaceous substances, and devastates our cabinets of Insects, if left undisturbed. It also establishes its domicil in cork(1).

The third and last section of the Serricornes, forming also a last tribe, that of the XYLOTROGI, is distinguished from the two preceding ones, as we have already stated, by the entire freedom of the head, and consists of the genus

LYMEXYLON, Fab.,

Which we will divide as follows.

In some, the maxillary palpi are much larger than those of the labium, pendent, pectiniform or tufted in the males, and terminated by a large ovoid joint in the females. The antennæ are short, slightly widened in the middle, and narrowed at the extremity. The tarsi are filiform, and all the joints entire; the four posterior long and very slender.

Those, whose elytra are very short, and in the form of a little scale, constitute the genus.

ATRACTOCERUS, Palis. de Beauv.—*Necydalis*, Lin.—*Lymexylon*, Fab.

The antennæ compressed and almost fusiform; thorax square; abdomen depressed.

A. necydaloides, Palis. de Beauv., Magaz. Encyclop.; *Necydalis brevicornis*, L.; *Lymexylon abbreviatum*, Fab.; *Macrogaster abbreviatus*, Thunb. This Insect is found in Guinea, and appears to differ but little from another species that inhabits Brazil. There is a second much smaller and perfectly distinct, enclosed in amber, that belongs to the Museum. A third is met with in Java.

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(1) See Schœnh., Synon. Insect., I, 2, p. 101. Some of the species of Fabricius belong to the genus *Cis*.

Those, in which the elytra are as long as the abdomen, or not much shorter, form two subgenera.

Here, the antennæ are compressed and serrated, the joints transversal; thorax almost square. Such is the

HYLEOŒTUS, Lat.—*Meloe, Cantharis*, Lin.—*Lymexylon*, Fab.

H. dermestoides; Meloe Marci, L., the male; *Lymexylon morio*, Fab.; *L. proboscideum*, Id.; *Cantharis dermestoides*, L., the female; *L. dermestoides*, Fab., Id.; Oliv., Col., II, 25; I, 1, 2, It. The female is six lines in length; pale-fulvous; pectus and eyes black. The male is black; the elytra sometimes blackish, and sometimes reddish with a black extremity. Germany, England, and the north of Europe.

There, the antennæ are simple, slightly or not at all compressed, and almost moniliform. The thorax is nearly cylindrical.

LYMEXYLON, Fab.—*Cantharis*, Lin.—*Elateroides*, Schæff.

L. navale, Fab., the female; *L. flavipes*, Id., the male; Oliv., Ib., 1, 4. Length of the preceding, but narrower; pale-fulvous; the head, exterior margin, and extremity of the elytra, black; the latter colour rather more predominant in the male. This Insect is very common in the Oak forests of the north of Europe, but rare in the vicinity of Paris; its larva is very long and slender, almost resembling a Filaria. It multiplied so excessively in the dock-yards at Toulon some years ago, as to destroy great quantities of timber(1).

In the others the palpi are very short, and similar in both sexes(2). The antennæ are always simple and of equal thickness throughout. The tarsi are short, and the penultimate joint in some is bilobate.

The body is of a firm consistence, the top of the head unequal or sulcated, and the thorax nearly square or suborbicular.

CUPES, Fab.

Joints of the antennæ almost cylindrical; penultimate joint of the tarsi bifid, mandibles unidentated under the point; palpi, maxillæ, and ligula exposed, the latter bilobate; mentum nearly semi-orbicular.

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(1) The *Lymexylon proboscideum* of Olivier, from which he took his description, and which is now in the cabinet of Count de Jousselin of Versailles, should form a separate genus. See also the *Lymexylon flabellicorne* of Panzer, Faun. Insect. Germ., XI, 10.

(2) The last joint, at least that of the maxillary palpi, is somewhat thicker and almost ovoid.

Two species are known, both proper to North America(1).

RHYSODES, Lat. Dalm.

The antennæ granose and all the joints of the tarsi entire. The mandibles appear to me to be narrowed and almost tricuspidate at the end; the mentum is corneous, very large, clypeiform and terminated superiorly by three teeth or points; the palpi are very short.

Notwithstanding the number of tarsial joints, this genus seems to approach that of Cucujus and even certain Brenti, with a short proboscis in both sexes. The habits of these Insects are the same as those of the Xylophagi(2).

FAMILY IV.

CLAVICORNES.

In the fourth family of the pentamerous Coleoptera, as in the third, we find four palpi, and elytra covering the superior surface of the abdomen, or its greater portion; but it differs in the antennæ, which are almost always thicker at the extremity, that even frequently forms a perfoliaceous or solid club; they are longer than the maxillary palpi, and their base is exposed, or barely covered. The legs are not natatory, and the joints of the tarsi, at least those of the posterior ones, are usually entire.

In their larva state, at least, they feed on animal matters.

We will divide this family into two sections: the common characters of the first of which are, antennæ always composed of eleven joints, longer than the head, not forming from the third a fusiform or nearly cylindrical club, and their second joint not dilated in the form of an auricle; last joint of the tarsi, as well as its hooks, of a moderate length, or small.

These Clavicornes are terrestrial, while those of our second section are aquatic or shore Insects, thus leading to the Palpicornes, most of which inhabit water, and whose antennæ never consist of more than nine joints.

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(1) *Cupes capitata*, Fab.; Lat., Gener. Crust. et Insect., I, viii, 2; Coqueb., Illust. Icon. Insect., III, xxx, 1.

(2) *Rhysodes exaratus*, Dalm., Analect. Entom., p. 93. This species has lately been discovered by M. Léon Dufour in the Pyrenees.

The first section will comprise several small tribes. The first, that of the PALPATORES, in a natural series, should be placed near the Pselaphii and Brachelytra(1). Their antennæ, which are, at least, as long as the head and thorax, slightly enlarge towards the extremity, or are nearly filiform; their two first joints are longer than the following ones. The head is distinguished from the thorax by an ovoid strangulation. The maxillary palpi project, are long and inflated at the extremity. The abdomen is large, oval or ovoid, and embraced laterally by the elytra. The legs are elongated, thighs clavate, and tarsial joints entire.

These Insects remain on the ground, under stones and other bodies. Some—the Scydmæni—frequent wet places. We will unite them in a single genus, that of

MASTIGUS.

MASTIGUS, Hoff.—*Ptinus*, Fab.

Joints of the antennæ nearly in the form of a reversed cone, the first very long and the last ones hardly thicker than the others; the two last joints of the maxillary palpi forming an oval club; thorax almost ovoid; abdomen oval(2).

SCYDMÆNUS, Lat. Gyll.—*Pselaphus*, Illig. Payk.—*Anthicus*, Fab.

Antennæ granose, sensibly inflated towards the extremity, and but slightly geniculate; maxillary palpi terminated by a very small and pointed joint; thorax nearly globular; the almost ovoid abdomen shorter in proportion than in Mastigus(3).

In all the following Clavicornes the head is generally sunk in the thorax, and the maxillary palpi are never at the same time so much projected and clavate; the ensemble of their physiognomy also exhibits other differences.

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(1) An approximation which appears to us to result from the organs of manducation and the habits.

(2) *Mastigus palpalis*, Lat., Gener. Crust. et Insect., i, 281; viii, 5. See Schœnh. Synon. Insect., I, ii, p. 59, and Klüg, Entom. Monog., p. 163.

(3) *Scydmænus Helwigii*, Fab.; *Notoxus minutus*, Panz., Faun. Insect. Germ. XXIII, 5;—*S. Godarti*, Lat., I, viii, 6;—*S. hirticollis?* Gyll.;—*S. minutus*, Id.; *Anthicus minutus*, Fab. See Schœnherr, Synon. Insect. I, ii, p. 57. M. Duros, of the King's body-guard, who is peculiarly fortunate in discovering small species,

The genus Hister forms our second tribe, which, with baron Paykull, who has so profoundly studied it, we will name the HISTEROIDES. Here the four posterior legs are more remote from each other at base than the two anterior, a character alone that distinguishes this tribe from all others of the same family. The legs are contractile, and the outer side of the tibiæ is dentated or spinous. The antennæ are always geniculate, and terminated by a solid club composed of crowded joints. The body is extremely firm, and usually forms a square or parallelopiped; the præsternum is frequently dilated anteriorly, and the elytra are as often truncated. The mandibles project, are strong, and frequently unequal as to size. The palpi are almost filiform, or slightly enlarged near the end, and terminated by an oval or ovoid joint.

In habits, the dentations of their tibiæ, and some other characters, these Insects seem to approach the Coprophagi Lamellicornes, but from other considerations, founded on their anatomy, they approximate to the Silphæ—such also is the opinion of M. Dufour, Ann. des Sc. Nat., Octob. 1824. The alimentary canal of the species he dissected—the *sinuatus*—is from four to five times the length of the body. The œsophagus is very short; the oblong enlargement that immediately follows exhibits through its parietes certain brownish lines, which seem to indicate the existence of internal triturating appendages; if this be the case, the enlargement is entitled to the appellation of gizzard; the chylific ventricle is very long, flexed, and studded with pointed and very salient papillæ. The hepatic vessels have six distinct insertions round the chylific ventricle—Ibid. July 1825. Randohr reduces their number to three, so that each of them would have two insertions: but such a disposition of their vessels is doubtful.

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has detected the *S. clavatus*, Gyll., in an Ant-hill near Paris. This fact, with some others, confirms me in my opinion that these Insects, with the Pselaphii, immediately follow the Brachelytra.

These animals feed on cadaverous or stercoraceous matters and decomposing vegetable substances, such as dung, old mushrooms, &c.: some establish their domicil under the bark of trees. Their gait is slow, and their colour a brilliant black or bronze. Such of their larvæ as have been observed—those of the *merdarius, cadaverinus*—feed on the same substances as the perfect Insect. Their body is glabrous, soft, and of a yellowish white, the head and first segment excepted, the dermis of which is brown or reddish; it is provided with six short legs, and is terminated posteriorly by two articulated appendages, and an anal and tubular prolongation; the squamous plate of the first segment is longitudinally canaliculated.

This tribe, as we have already stated, will consist exclusively of the genus

HISTER, Lin.

Baron Paykull restricted his division of this genus to the separation of certain strongly flattened species, with which he formed that of Hololepta, but Doctor Leach has established four more(1).

In some, the tibiæ, at least the anterior ones, are triangular, dentated exteriorly, and the antennæ always free and exposed; the body is generally square, but slightly or not at all inflated.

They may be divided into two subgenera. In the first or

HOLOLEPTA, Payk.

The body is strongly flattened, the præsternum does not project over the mouth, and the four posterior tibiæ have but a single range of spines; the terminal lobe of the maxillæ is prolonged; the mentum is deeply emarginated, and the palpi, proportionally more advanced, are formed of almost cylindrical joints.

They live under the bark of trees. The animal figured by Paykull, as the larva of a species of this subgenus, is that of a species of Syrphus, or Fly(2).

The other Histeroides, in which the præsternum projects over the mouth, the maxillæ are terminated by a short lobe, with but slightly projecting palpi composed of joints which, the last excepted, are rather in the form of a reversed cone than cylindrical, and finally, in which the mentum is slightly emarginated, will re-enter the subgenus

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(1) Zool. Miscell., III, p. 76.

(2) Hist. Monog., p. 101, et seq.

HISTER, properly so called.

Some species in which, as in the Hololeptæ, the four posterior tibiæ have but a single range of small spines, and that also live under the bark of trees, constitute the genera PLATYSOMA and DENDROPHILUS of Leach. The first(1) only differs from the second(2) in the flattening of the body above, and in the shortening of the thorax, which is also narrowed anteriorly. A species of the same division, *H. proboscideus*, Payk., Monog., VIII, 4, has a peculiar form. The body is long and narrow, and the thorax more than half as long again as it is wide.

The remaining Histeroides have two ranges of spines on the four posterior tibiæ. They are the only ones which Dr Leach retains in the genus Hister.

H. unicolor, L.; Payk., Ib., II, 7. Four lines in length; entirely black and glossy; three dentations on the exterior side of the two first tibiæ; two striæ on each side of the thorax, and four on the external part of each elytron, that nearest the margin interrupted. Very common.

The number of tibial dentations, that of the striæ on the thorax and elytra, their punctures, and the form of the body, have furnished M. Paykull with excellent characters, by means of which he has well described the species.

A last subdivision of this tribe comprises very small Histeroides, with a thick and almost globular body, of which the but slightly or not at all laterally compressed præsternum does not advance over the mouth, and is straight in front.

In some—ABRÆUS, Leach—it is prolonged to the anterior angles of the thorax, and entirely covers the antennæ when they are contracted; in the others—ONTHOPHILUS, Leach—it is narrower; but here the antennal club is received into a very distinct orbicular cavity, situated under the anterior angle of the thorax. The anterior tibiæ are frequently narrow, almost linear, and edentated. The last superior semi-segment of the abdomen is curved inferiorly, and appears to terminate it(3).

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(1) *Hister picipes*, Fab.; Payk., Ib., VIII, 5;—*H. flavicornis*, Id., VIII, 6;—*H. oblongus*, Id., X, 3.

(2) *A. punctatus*, Id. VII, 5.

(3) The *H. globosus*, Payk., VIII, 2, is referred by Leach to his genus *Abræus*, and also the *H. minutus*, Id., VIII, 1; to his *Onthophilus*, he refers the *Hist.*

The legs of the other Clavicornes are inserted at an equal distance from each other. Those in which these organs are not contractile, and the tarsi at most can only be flexed on the tibiæ, whose mandibles are most commonly salient and flattened or not thick, and whose præsternum is never dilated anteriorly, will constitute five other tribes.

In the third tribe of this family, that of the Silphales, we find five distinct joints in all the tarsi, and the mandibles terminating in an entire point without emargination or fissure(1). The antennæ terminate in a club that is most commonly perfoliaceous and consisting of from four to five joints. The internal side of the maxillæ, in most of them, is furnished with a horny tooth. The anterior tarsi are frequently dilated, at least in the males. The exterior margin of the elytra of the greater number is marked by a groove with a well raised border.

This tribe is composed of the genus

Silpha, Lin.—*Peltis*, Geoff.

Here the antennæ are suddenly terminated by a short and solid club, formed by the four last joints; the second is larger than the following ones. The body is almost square, the elytra are truncated, the tibiæ dentated, the tarsi simple, and the mandibles bidentated on the inner side; the last joint of the maxillary palpi is as long as the two preceding ones taken together. There is a horny tooth on the inner side of the maxillæ. So closely do these Insects resemble the Histeroides, that Fabricius confounded them. Such are those which form the

Sphærites, Dufts.—*Sarapus*, Fisch.—*Hister*, Fab.—*Nitidula*, Gyllen.(2)

Here, the antennæ terminate in a perfoliaceous club.

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striatus, Payk., Ib., XI, 1;—*H. sulcatus*, X, 8;—the *hispidus*, Id., XI, 2, appears to be congeneric. The genus *Ceutocerus* of Germar, Insect. Spec. Nov., I, p. 85, 1, 2, from the form of the antennæ, legs, &c., would naturally seem to come after the *Histeroides*, but the elytra cover the abdomen and the mandibles are not salient. I have never seen a specimen of this genus.

(1) Dentations however are sometimes found on the internal side, as in Sphærites.

(2) Dufts., Faun. Aust., I, p. 206; *Hister glabratus*, Fab.; Sturm, I, xx; *Sarapus*, Fisch., Mem. of the Soc. of Nat. of Moscow.

Sometimes the body is oblong, and the head, strangulated posteriorly, is as wide as the anterior margin of the thorax, or not much narrower; the latter forms a square with rounded angles; the elytra form a long square, and are suddenly and strongly truncated at their posterior extremity. The posterior thighs, at least in the males, are usually inflated. The last joint of the maxillary palpi is rather more slender than the preceding one, almost cylindrical, somewhat smaller at the end, and obtuse. The anterior tarsi are dilated in the males.

Necrophorus, Fab.—*Silpha*, Lin.—*Dermestes*, Geoff.

The antennæ, hardly longer than the head, terminate abruptly in an almost globular club of four joints, the first of which is long, and the second much shorter than the third. The body nearly forms a parallelopiped; the thorax is widest anteriorly; all the tibiæ are strong, widened at the extremity and terminated by stout spurs; the elytra are truncated at right angles. The maxillæ are destitute of a horny unguiculus.

Their instinctive habit of burying the bodies of Moles, Mice, and other small Quadrupeds, have procured for them the names of *enterreurs* and *porte-morts*. When they find a dead animal of the above description, they work under it and excavate a hole of sufficient dimensions to contain the body, which they gradually drag into it; in this body they deposit their ova, and thus the larvæ find their food in the very nidus in which they are hatched. They are long, and of a greyish white colour; the anterior segments are covered superiorly with a small, fulvous-brown, squamous plate, and the posterior with little elevated points. They are furnished with six feet and strong mandibles. When about to pass into the state of a chrysalis, they penetrate deeply into the earth, where they construct a cell, which they line with a viscid substance.

These Insects, as well as many others that inhabit dead animal bodies, diffuse a strong odour resembling musk. Their habits have lately attracted the attention of Mole-catchers, and in the work entitled *L'Art du Taupier* we find certain facts relative to this subject which had escaped the observations of naturalists. The sense of smell must be excessively acute in these Insects, for but a short time elapses after a Mole has been killed, when Necrophori are seen circling about it, although they were previously sought for in vain in the same locality.

The digestive canal of the Necrophori and Silphæ is at least thrice the length of the body. The œsophagus is very short and followed by an ellipsoidal gizzard, whose lining tunic is slightly scabrous and bristled, at least in several species, with pointed setæ variously directed, but arranged in eight longitudinal bands separated by smooth intervals. The intestinal canal is very long, particularly in the Necrophori and Necrodes. Its surface, in the latter, as well as in the Silphæ, is thickly studded with salient and granular points. It opens, either laterally or directly, into a smooth enlargement, which, according to Dufour—Ann. des Sc. Nat., Octob. 1824—may be compared to a cæcum. To the side is appended, a pediculated oval or oblong bursa which constitutes a part of the excrementitious apparatus. There are four biliary vessels, slender, extremely long and very flexuous, each of which is separately inserted round the extremity of the chylific ventricle.—Dufour, Ib., July 1825. From the figure of the alimentary canal of the *Necrophorus vespillo*, given by Randohr, it appears that the great intestine, instead of being covered with granular papillæ, is furnished with transverse muscular fillets, forming annular plicæ.

N. vespillo; *Silpha vespillo*, L.; Oliv., Col. II, 10, i, 1. From seven to eight lines in length; black; three last joints of the antennæ red; elytra with two orange, transverse and indented bands; coxæ of the two posterior legs armed with a strong tooth; the tibiæ are curved.

N. mortuorum, Fab.; Panz., Faun. Insect. Germ., XLI, 3. Smaller; antennæ entirely black; the second transverse orange band of the elytra observed on the vespillo, usually forming a large lunated spot. Found in woods, and frequently in mushrooms.

N. germanicus, Fab.; Oliv., Ib., 1, 2, a, b. More than an inch long; all black; external margin of the elytra fulvous; a ferrugineous yellow spot on the front.

N. humator, Fab.; Oliv., Ib. i, 2, c. Always smaller than the germanicus, and differing from it in the orange hue of the antennal club.

North America produces several species, one particularly—*N. grandis*, Fab.—that surpasses all others in size(1).

This genus seems to be confined to the northern districts of Europe and America.

Necrodes, Wilk.—*Silpha*, Lin. Fab.

The antennæ manifestly longer than the head, and terminated by an elongated club of five joints, the second of which is larger than the third. The body is an oblong oval, with an almost orbicular thorax, widest in the middle; the tibiæ are narrow, elongated, but slightly widened at the end, and terminated by two ordinary spurs; the elytra are obliquely truncated.

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(1) For the other species, see Fab., Oliv., and Schœnherr, I, ii, p. 117.

Species of this subgenus are found in Europe, tropical America, the East Indies and New Holland(1).

Sometimes the body is oval or ovoid; the head, not at all or but very slightly strangulated posteriorly, and narrower than the thorax; the thorax either almost semicircular and truncated, or trapezoidal and wider behind; the elytra rounded or simply emarginated at the posterior extremity. There is but little or no difference in the posterior legs of the two sexes.

The maxillæ are armed internally with a tooth or squamous hook.

SILPHA, Lin. Fab.—*Peltis*, Geoff.

The body almost scutiform and depressed, or but slightly elevated; thorax semicircular, truncated or very obtuse before; exterior margin of the elytra strongly recurved and canaliculated; palpi filiform, their last joint almost cylindrical, and in several, terminating in a point. Most of them live in carrion, and thus diminish the quantity of its noxious effluvia. Some climb on plants, and particularly on the stems of Wheat, where they find little Helices on which they feed. Others remain on high trees and devour caterpillars. The larvæ are all equally active, live in the same manner, and frequently in large societies. They bear a great resemblance to the perfect Insect. Their body is flattened, and consists of twelve segments, with acute posterior angles; the posterior extremity is narrower and terminated by two conical appendages.

In most of the species, the two anterior tarsi of the males are alone more dilated than the others. The antennæ insensibly enlarge or terminate abruptly in a club of four joints at most, the second and third of which differ but little; the last joint of the maxillary palpi is, at most, as long as the penultimate, and frequently somewhat shorter and more slender.

Those species in which the extremity of the antennæ is distinctly perfoliaceous or composed of joints, which, the last excepted, are wider than they are long, where this club is abrupt, and the elytra are emarginated at their extremity, at least in the males, form the genus THANATOPHILUS, Leach(2).

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(1) *Silpha littoralis*, Fab., Oliv., Col., II, i, 8, a, b, c;—*S. surinamensis*, Fab. Oliv., Ib., II;—*S. lachrymosa*, Schreib., Lin. Trans., VI, xx, 5;—*S. indica*, Fab., &c.

(2) *Silpha sinuata*, Fab.; Oliv., Ib., II, 12;—*S. dispar*, Illig., Gyllenh., &c.

Those, in which the elytra are entire, but where the antennæ are similar to those of the preceding, constitute his Oiceptoma.

S. thoracica, L.; Fab.; Oliv., Col. II, 11, i, 3, a, b. Black; thorax red and silky; three flexuous elevated lines on each elytron, the exterior shortest, forming a carina, and terminating near a transverse tubercle; posterior extremity of the elytra, in the males, terminating in a point at the suture. In the woods particularly.

S. quadripunctata, L.; Fab.; Oliv., Ib., I, 7, a, b. Black; margin of the thorax and elytra yellowish, each of the latter with two black dots, one at base and the other in the middle. Peculiar to forests, but usually remains on young Oaks, where it feeds on caterpillars(1).

Those in which the extremity of the antennæ is likewise perfoliaceous, but where the club is formed gradually, according to Leach, alone retain the generic appellation of *Silpha*. They are usually found in fields, along the roads, &c.

S. lævigata, Fab.; Oliv., Ib., I, i, a, b. Shining black; multipunctured; thorax much narrower than before; elytra without elevated lines.

S. obscura, L.; Fab.; Oliv., Ib., II, 18. Dusky black; thorax truncated anteriorly; elytra more deeply punctured; three raised but slightly salient and short lines, the intermediate the longest, on each of the latter.

S. reticulata, L.; Panz., Faun. Insect. Germ., V, 9. Opaque black; thorax truncated before; three raised lines on each elytron, the exterior largest and forming a carina, terminated by a tubercle, with transverse rugæ in the intervals(2).

The antennæ of some are not distinctly perfoliate at the extremity, the last joints being almost globular. They are the Phosphuga, Id.(3)

A species from Germany, which might form a separate subgenus —Necrophilus, Lat.—is removed from the preceding ones by several characters. It is the

S. subterranea, Illig., and others. The four anterior tarsi are similar and dilated at base, the two first joints, at least in the males, being evidently broader than the two following ones. The third joint of the antennæ is longer than the preceding one, and the five last form abruptly a perfoliaceous club. The last joint of the maxillary palpi is as long as the two preceding ones taken together.

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(1) Add, *S. rugosa*, Fab.; Oliv., II, Ib., 17;—*S. laponica*, Fab.

(2) Add, *S. opaca*, Fab.; Herbst., Col., LI, 16;—*S. tristis*, Illig., &c.

(3) *S. atrata*, Fab.;—*S. pedemontana*, Id., var.; Oliv., Ib., I, 6.

ARGYRTES, Frœh.—*Mycetophagus*, Fab.

The body tolerably thick, convex, and arcuated superiorly, not scutiform; thorax somewhat wider than long, and a little narrower before; exterior margin of the elytra inclined and not canaliculated; last joint of the maxillary palpi thicker and ovoid(1).

Certain Clavicornes, which seem to approach Argyrtes in their habits and other characters, but whose mandibles are cleft or bidentated at the extremity, will compose our fifth tribe, that of the SCAPHIDITES. Their tarsi consist of five very distinct and entire joints. The body is oval, narrowed at both ends, arcuated or convex above, and thick in the middle; the head low, and received posteriorly into a trapezoidal thorax, widest behind, the margin of which is but slightly or not at all recurved. The antennæ are usually at least as long as the head and thorax, and terminated in a quadriarticulated and elongated club. The last joint of the palpi is conical. The legs are elongated and slender. With the exception of some species—the Cholevæ—the tarsi are nearly similar in both sexes.

This tribe consists of the genus

SCAPHIDIUM.

SCAPHIDIUM, Oliv. Fab.—*Silpha*, Lin.

In the true Scaphidia, the five last joints of the antennæ are almost globular, and compose the club. The maxillary palpi project but little, and gradually taper to a point, the penultimate joint not being thicker than the last at their junction. The body is navicelliform; the margin of the thorax slightly recurved, and the elytra truncated. They inhabit mushrooms. But few species are known; one from Cayenne and the rest from the north of Europe(2).

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(1) *Argyrtes castaneus*, Gyllen., Insect., Suec. I, iii, p. 682; *Mycetophagus castaneus*, Fab.; *M. spinipes*, Panz, Faun. Insect. Germ., XXIV, 20. I suspect the *A. subniger*, Dej., is merely the female.

(2) Oliv., Col., II, 20. [We have at least one species, the *S. 4-guttatum*, Knoch, Melsh. Catal., if not another, the *S. 4-pustulatum*?, Id. Ib. See Say, Journ. of the Acad. of Nat. Sc. of Philad. III, 199. *Am. Ed.*].

CHOLEVA, Lat. Spence.—*Catops*, Fab.—*Peltis*, Geoff.

Most of the joints of the antennal club turbiniform and more or less perfoliaceous; maxillary palpi very salient and abruptly subulate; the body ovoid; thorax plane, without a border; the four first joints of the anterior tarsi, and the first of the intermediate ones, dilated in the males of some species—*Catops blapsoides*, Germ.

In the Cholevæ properly so called, the antennæ are about the length of the head and thorax; their eighth joint, or the second of the club, is evidently shorter than the preceding and following one, and sometimes is even indistinct; the last is semi-ovoidal and pointed(1).

In the MYLŒCHUS, Lat. Oliv.,—*Catops*, Payk., Gyll., the antennæ are shorter, the eighth joint is larger than the preceding, and almost equal to the following one, the last is rounded and obtuse on the summit(2).

The fifth tribe, or that of the NITIDULARIÆ, approximates to the fourth in the scutiform and bordered body, but the mandibles are bifid or emarginated at the extremity; the tarsi seem to consist of but four joints, the first and last, in some, being only visible beneath, where they merely form a slight projection, and the penultimate in the remainder being very small, in the form of a knot, enclosed between the lobes of the preceding ones. The antennal club is always perfoliaceous, consists of three or four joints, and is usually short or but little elongated.

The palpi are short and filiform, or somewhat thickest at the extremity. The elytra in several are short or truncated. The legs are but slightly elongated, and their tibiæ frequently widened at the end; the tarsi are furnished with hairs or pellets. The habitation of these Insects varies with the species; they are found on flowers, in mushrooms, putrified meat, and under the bark of trees. They form the genus

NITIDULA.

In some, the antennal club consists of but two joints, and the anterior part of the head projects in the manner of a semicircular flattened clypeus, covering the mandibles and other parts of the mouth.

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(1) Lat. Gener. Crust. et Insect., II, p. 26. See the Monograph of this genus, published by M. Spence in the Lin. Trans., and Paykull and Gyllenhal.

(2) Lat. Ib., p. 30, VIII, ii; Oliv., Encyclop. Méthod., article *Mylæque*.

Colobicus, Lat.

In this and the following subgenus, the tarsi, from the point where they are movable, seem to consist of but four joints, of which the three first, much shorter than the last, are entire, and simply furnished underneath with a greater or smaller number of hairs; the first, as in several of the Cleri of Fabricius, is only visible underneath, where it forms a little projection; it is also pilose. The palpi of the Colobici and those of the following subgenus are terminated by a joint somewhat thicker than the preceding one(1).

In the other Nitidulariæ, the antennal club always consists of three joints, and the head never projects over the mouth.

Sometimes the first joint of the tarsi, as in the Colobici, is very short, and the three following ones elongated, equal, entire and simply pilose underneath; the palpi are thickest at the extremity. Such is

Thymalus, Latr.—*Peltis*, Fab.—*Silpha*, Lin.

In those species where the body is almost hemispherical—*limbatus*—the antennal club is proportionally shorter, and the third and following joints smaller than the second; the tibial spurs are extremely small(2).

Sometimes the three first joints of the tarsi, at least those of the males, are short, wide, and emarginated or bilobate; the fourth is very small, but slightly or not at all visible; the maxillary palpi, at least, are filiform.

Here, the tibiæ, at least the anterior ones, are widened at the extremity in the form of a reversed triangle; the first joint of the antennæ is usually larger than the second, and the elytra are generally truncated posteriorly, or very obtuse.

In the two following subgenera, the third joint of the antennæ is evidently longer than the following one, and the antennal club abrupt and nearly orbicular or oval.

Ips, Fab.—*Nitidula*, Oliv. Lat.—*Silpha*, Lin.

The body always forming an oblong oval, and depressed; posterior extremity of the abdomen exposed; one of the mandibles—the left—truncated and tridentated at the extremity, and the other widened and broadly emarginated or concave at the same end; terminal lobe of the maxillæ elongated(1).

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(1) Lat., Gener. Crust. et Insect., II, p. 9, and I, xvi, 1.

(2) See Fabricius, Gyllenhal, and Schœnherr.

NITIDULA, Fab.—*Nitidula*, *Strongylus*, Herbst.—*Silpha*, Lin.

The two mandibles become narrowed near the extremity and terminate in an emarginated or bifid point.

Some are flattened,. oblong, or ovoid; the others are orbicular and arched or proportionally more convex than the preceding. Thus some authors have placed certain species in genera of a similar form but otherwise very different, such as Spheridium and Tritoma.

> *N. æneus*, Fab.; *N. viridescens*, *rufipes*, var., Id.; Oliv., Col., II, ii, 12; III, 20, a, b; V, 33, a, b. Small; form, an oblong ovoid; of a brilliant bronze-green and multi-punctured; antennæ blackish terminated by a very large obtuse club; thorax transversal, slightly emarginated anteriorly, and bordered laterally; legs sometimes blackish-brown, and sometimes fulvous(2).

Here the second and third joints of the antennæ are almost equal in size, and the club is elongated in the form of a reversed cone, or is pyriform.

CERCUS, Lat.—*Catheretes*, Herbst. Illig.—*Dermestes*, Lin. Fab.—*Sphæridium*, Fab. Gyll.—*Nitidula*, Oliv.

The body depressed, and elytra truncated; two first joints of the antennæ much larger in the males of some species than in the females, and perhaps this subgenus should consist of such only, referring the others to Nitidula(3).

There the tibiæ are long, narrow, and almost linear; the elytra cover the abdomen and are not truncated.

The body is oval, thorax trapezoidal, and the antennal club oblong; its two first joints are nearly equal, and the third is hardly longer than the fourth. Such are the

BYTURUS, Lat. Schœnh.—*Dermestes*, Geoff. Fab. Oliv.—*Ips*, Oliv.(4)

Those that compose our sixth tribe, that of the ENGIDITES, analogous to the Nitidulariæ in the emargination of the extremity of their mandibles, are distinguished from them by their not projecting, or but very little and simply on the sides, beyond the labrum. Their body is oval or elliptical, and the anterior extremity of the head slightly extended into an obtuse or truncated point. The tarsi consist of five(1) distinct joints, entire, and at most, slightly pilose underneath; the penultimate is somewhat shorter than the preceding one. The antennæ terminate in a perfoliaceous triarticulated club; the elytra completely cover the abdomen, and the palpi are somewhat thicker at the extremity. Some very small species inhabit the interior of houses, and are frequently found on windows.

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(1) Some of the species of Fabricius should apparently be referred to his genus *Engis*.

(2) See Fabricius, Olivier, Gyllenhal, Schœnherr, &c.

(3) See Gyllenh., Insect. Suec. I, p. 245.

(4) See Schœnh., Synon. Insect. I, ii, p. 95.

We will unite them all in a single genus, that of

DACNE.

DACNE, Lat.—*Engis*, Fab. Dej.—*Erotylus*, Oliv.

Their antennæ terminate abruptly in a very large orbicular or ovoid and compressed club, composed of crowded joints, of which the middle one at least is much wider than it is long; the third is longer than the second and fourth.

The middle of the posterior margin of the thorax is dilated behind or lobate, and the superior extremity of the mentum terminated in a truncated or bidentated point(2). In

CRYPTOPHAGUS, Herbst. Schœnh.—*Dermestes*, Lin. Fab.—*Ips*, Oliv. Lat.—*Antherophagus*, Knoch,

The antennæ are moniliform, their second joint as large as the preceding or larger, and terminating in a less abrupt and narrower club than in Dacne, and with intervals between its segments(3).

We now come to certain tribes in which the præsternum is frequently dilated anteriorly in the manner of a chin-cloth, and which differ from the preceding ones in their feet, which are either wholly or partially contractile; the tarsi may be free, but the tibiæ at least can be flexed on the thigh. The mandibles are short, and generally thick and dentated. The body is ovoid, thick, and covered with deciduous scales or hairs of various colours. The antennæ are straight and usually shorter than the head and thorax. The head is plunged into the thorax as far as the eyes. The thorax is but slightly or not at all bordered, trapezoidal, and wider posteriorly; the middle of its posterior margin is frequently somewhat prolonged or lobate. The larvæ are pilose, and mostly feed on the exuviæ or carcasses of animals. Several are very injurious to entomological collections.

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(1) Certain Cytophagi, or at least their males, according to some authors are heteromerous.

(2) See Fab., Syst. Eleut.

(3) See Schœnh., Synon. Insect., I, ii, p. 96.

The antennæ of the Antherophagi are proportionally thicker, composed of more transversal joints, and terminated almost gradually in a club; from the second to the eighth they are nearly equal. The *Cryptophagus silaceus*, Gyll., has a projection in the form of a tooth or horn on each side of the inferior surface of the head. The Triphylla of Megerl. and Dej. only differ from the Crytophagi in the number of their tarsial joints.

Those then in which the legs are not completely retractile, the tarsi being always free, and the tibiæ elongated and narrow, form our seventh tribe, that of the DERMESTINI, and the great genus

DERMESTES.

The only insects of this tribe whose antennæ do not present two distinct joints, and whose very short and inferiorly inflated palpi afterwards terminate in a point, are those which form the

ASPIDIPHORUS, Ziegl. Dej.

Their body is orbicular(1).

From among the species in which the antennæ consist of eleven distinct joints, and the palpi are filiform or gradually enlarge, we will first separate those whose antennæ are not received into particular fossulæ in the under part of the thorax. The præsternum rarely extends over the mouth(2).

In some, the antennæ terminate abruptly in a large perfoliaceous triarticulated club.

DERMESTES, Lin., Geoff., Fab.

In Dermestes, properly so called, the antennæ are similar, or differ but very slightly in both sexes; the length of the last joint is never much greater than that of the preceding ones.

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(1) *Nitidula orbiculata*, Gyllenh.

(2) The only exceptions are found in the *Dermestes undatus* (Megatoma) of Fabricius, and the Limnichi, Ziegl.

Certain species do great injury among furs, and devastate our collections of natural history. De Geer calls them *dissectors*, and in fact the *Dermestes lardarius* cuts to pieces the Insects of the cabinet into which it has penetrated. The others devour the dead bodies of all kinds of animals.

D. lardarius, L.; Oliv., Col., II, 9, 1, 1. Black; base of the elytra cinereous and dotted with black. The larva is elongated, insensibly tapered from head to tail, of a chesnut-brown above, white beneath, furnished with long hairs and two squamous horns on the last annulus. Its excrements resemble long threads(1).

MEGATOMA, Herbst. Lin. Geoff. Fab.

The Megatomæ only differ from Dermestes in the club of their antennæ, which is much more elongated in the males than in the females; the terminal joint is lanceolate or forms an elongated triangle.

M. pellio; Dermestes pellio, L.; Oliv., Ib., II, ii. But two lines and a half in length; black; three white dots on the thorax, and one on each elytron, formed by down. The larva is greatly elongated, of a glossy reddish-brown, and covered with reddish hairs, those of the posterior extremity forming a tail. It moves by sliding, and as if by jerks, which is also the case with the perfect Insect, and the Dermestes(2).

In others, such as

LIMNICHUS, Zieg. Dej.,

The antennæ become gradually thicker, and terminate in a larger and ovoid joint; they are granose, and received under the anterior angles of the thorax. The maxillæ are terminated by two lobes, the exterior of which is narrow and palpiform. The labial palpi are very small; the last joint of those of the maxillæ is larger than the preceding ones and ovoid(3).

In all the following subgenera, the antennæ, or at least their club, are received into particular and lateral cavities in the under part of the thorax. The præsternum is always dilated or projected forwards in the manner of a chin-cloth.

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(1) Add *D. vulpinus*, *murinus*, *affinis*, *laniarius*, *tesselatus*, *trifasciatus*, Gyll., Insect. Suec., I, p. 145, et seq.

(2) Add the *Dermestes megatoma*, Fab., of which his *macellarius* appears to be the female;—*D. emarginatus*, Gyll.;—*D. undatus*, Fab. The præsternum in this latter species projects over the mouth.

(3) *Byrrhus sericeus*, Duft.; *B. pygmæus*, Sturm.

Here, the antennal club is perfoliaceous and not solid. In

Attagenus, Lat.—*Megatoma*, Lat.—*Dermestes*, Fab.

The club is very large, almost serriform, and composed of three joints, of which the first and last, particularly in the males, are the longest. The body is ovoid, short, and but slightly convex. The last joint of the maxillary palpi is larger and ovoid(1).

Trogoderma, Lat., Dej.—*Anthrenus*, Fab.

Antennal club quadriarticulated at least; body ovoid and oblong; palpi filiform(2).

The antennal club is now solid or formed of crowded joints. The body is ovoid, short, and completely covered with little deciduous scales. The thorax is lobate posteriorly. In

Anthrenus, Geoff. Fab.—*Byrrhus*, Lin.

The antennæ, terminated by a club in the form of a reversed cone, are received into short cavities under the anterior angles of the thorax.

These Insects are very small, living on flowers in their perfect state and in that of larvæ devouring desiccated animal matters, insects particularly. The larvæ are oval and furnished with hairs, some of which are dentated, forming tufts; the last are prolonged posteriorly into a kind of tail. Their final exuvium serves as a cocoon for the chrysalis.

> *A. verbasci; Byrrhus verbasci*, L.; Oliv., Col. II, 10, 1, 2, Grey above, reddish-yellow beneath; the two angles of the thorax, two transverse bands on the elytra, and a spot near their extremity, grey(3).

Globicornis, Lat.

The antennæ terminating in a globular club, and received into fossulæ extending to near the posterior angles of the thorax(4).

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(1) *Dermestes serra*, Fab.; *Attagenus serra*, Lat., Hist. Nat. des Crust. et des Insect., IX, p. 244; *Megatoma serra*, Id., Gener. Crust. et Insect., I, viii, 10; *Anthrenus viennensis*, Herbst., Col. VII, cxv, 10, k.

(2) *Anthrenus elongatus*, Fab.; *A. ruficornis*, Lat. Gen. Crust. et Insect., II, p. 59;—*A. versicolor*, Creutz., Ent. Vers., I, ii, 21, a;—*Dermestes subfasciatus*, Gyll., Insect. Suec., I, p. 155.

(3) See Oliv., Ib., and Fabricius, Syst. Eleut., I, p. 106.

(4) *Megatoma rufitarsis*, Lat., Gener. Crust. et Insect., II, p. 35; *Dermestes rufitarsis*, Panz., Faun. Insect. Germ., xxxv, 6.

The eighth tribe, that of the BYRRHII, differs from the preceding in the perfect contractility of the legs; the tibiæ are susceptible of being flexed on the thighs, and the tarsi on the tibiæ(1), so that when thus folded and pressed against the body, the animal seems to be inanimate and entirely destitute of feet. The tibiæ are usually broad and compressed. The body is short and convex.

This tribe is chiefly composed of the genus

BYRRHUS, Lin.

Those species which form the

NOSODENDRON, Lat.

Are removed from the others by their entirely exposed, very large, and scutiform mentum. Their antennæ terminate abruptly in a short, perfoliaceous and triarticulated club. They are found in wounds of trees, of the Elm particularly(2).

BYRRHUS, Lin.—*Cistela*, Geoff.

The true Byrrhii differ from the preceding Insects in their mentum, which is of an ordinary size and interlocked (at least partially) by the præsternum, whose anterior extremity is dilated.

In some, the antennæ enlarge insensibly, or terminate in an elongated club formed of from five to six joints.

B. pilula, L.; Oliv., Col. II, 13, 1, 1. From three to four lines in length; black beneath, blackish-bronze or soot-colour and silky above, with little black spots mingled with lighter ones arranged in lines.

M. Waudouer has detected the larva of a variety of this species. It is narrow and elongated; the head thick; the plate of the first segment large, and the two last longer than the others. It lives in Moss.

A second species—*striato-punctatus*, Dej.—with similarly formed antennæ, constitutes a separate division, on account of its tarsi, of which the fourth joint is very small and concealed between the lobes of the preceding one.

The antennæ of another species, very small and covered with hairs, terminate in a triarticulated club. It forms the genus Trinodes, Megerl., and Dej.(1)

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(1) In the Anthreni all the tibiæ fold against the posterior side of the thighs; but in the others, the two that are anterior are flexed towards the head, and the other behind.

(2) Lat., Ib., II, p. 43; Oliv., Encyc. Méthod., article *Nosodendre*.

On similar grounds we might also separate from the Byrrhii some other analogous species(2), in which the antennal club consists of but two joints, the last much the thickest and nearly globular.

All the Byrrhii remain on the ground in sandy localities(3).

It is impossible to describe the Clavicornes of our second section, although a very natural one, but by the reunion of several characters. Some of these Insects are removed from all others of the family by their antennæ, which consist of nine or six joints; they are those, which, in this respect, seem to approximate most closely to the Palpicornes. The antennæ of the other Clavicornes of the same section are composed of eleven or ten joints; but sometimes they are not much longer than the head, and from the third joint form an almost cylindrical or fusiform club, arcuated and somewhat serrated; sometimes they are nearly filiform and as long as the head and thorax united; but here, as in most of the other subgenera of the same division, the tarsi are terminated by a large joint furnished with two strong terminal hooks. Those of some—*Heterocerus*, *Georissus*—consist of but four joints.

The body of these Insects is generally ovoid, and their head plunged to the eyes in a trapezoidal thorax, with a recurved lateral margin, and terminating posteriorly in acute angles; the præsternum is dilated anteriorly(4), and the legs are imperfectly contractile. They are found in the water, under stones in the vicinity of shores, and frequently in the mud: some of them—*Dryops*—are allied to the Gyrini by the structure and shortness of their antennæ.

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(1) *Anthrenus hirtus*, Fab.; Panz., Faun. Insect. Germ., XI, 16.

(2) *Byrrhus erinaceus*, Ziegl.;—*B. setiger*, Illig.

(3) For the other species, see Fabricius, Olivier, Schœnherr, Gyllenhal, &c.
The genus Murmidius, Leach, according to that gentleman, belongs to this tribe. The antennæ are composed of but ten joints, the last of which forms an ovoido-globular club. See Lin. Trans., XIII, p. 41.

(4) The Potamophili excepted.

I will divide this section into two tribes(1). The Insects which compose the first or the **Acanthopoda** are remarkable for their flattened and tolerably wide tibiæ, armed anteriorly with spines; for their short quadriarticulated tarsi, the hooks of which are of the usual size; and for their depressed body. The præsternum is dilated. The antennæ are a little longer than the head, arcuated, and formed of eleven joints, the last six constituting an almost cylindrical and slightly serrated club; the second is short and not dilated.

This tribe is composed of the single genus

Heterocerus, Bosc. Fab.

These Insects are found in the sand or mud, along the borders of rivulets, marshes, &c., issuing from their holes when disturbed by the trampling of feet. The form of their tibiæ enables them to turn up the earth, and conceal themselves in it; their tarsi can be flexed upon the tibiæ. There also reside their larvæ, which were first discovered by M. Miger.

H. marginatus, Fab.; *H. lævigatus*, Id.; Panz., Faun. Insect., Germ., XXIII, 12. A small, blackish, and silky Insect, with little yellowish or reddish spots, varying in form and number, and sometimes even wanting on the elytra.

M. Gyllenhal observes that the tarsi really consist of five joints, the first of which is small and oblique. See Insect. Suec. I, p. 138.

The second tribe, or that of the **Macrodactyla**, comprises Clavicornes with simple, narrow tibiæ and long tarsi, all—one genus excepted (*Georissus*), well distinguished from every other of the tribe, by its antennæ of nine joints, of which the three last form an almost solid club—composed of five distinct joints, the last of which is large, with two stout terminal hooks. The body is thick or convex. The thorax is less rounded, and most commonly terminates on both sides in acute angles.

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(1). We might also divide the section in the following manner.

- I. Antennæ composed of eleven joints.
  - A. Antennæ clavate and very short.
    - a. Tibiæ spinous; tarsi quadri-articulated.
      Heterocerus.
    - b. Tibiæ simple; five joints in the tarsi.
      Potamophilus. Dryops.
  - B. Antennæ filiform or slightly enlarged near the end, as long as the head and thorax.
    Elmis.
- II. Antennæ nine or six joints.
  Macronychus. Georissus.

The principal type of this tribe is the genus

DRYOPS, Oliv.,

Or that of *Parnus*, Fab., which is divided in the following manner.

1. Those whose antennæ, never much longer than the head, are composed of from ten to eleven joints, which, from the third, form an almost cylindrical or slightly fusiform club, arcuated, and somewhat serrated.

POTAMOPHILUS, Germ.—*Parnus*, Fab.

The Potamophili, which, ignorant of the establishment of this subgenus, we had named HYDERA(1), have their antennæ exposed, and not received into particular cavities; they are rather longer than the head; the first joint is almost as long as the following ones taken together, and the second short and globular. The palpi are salient, and the mouth is completely exposed as the præsternum does not project over it, a character in this tribe exclusively peculiar to this subgenus(2).

DRYOPS, Oliv.—*Parnus*, Fab.

In Dryops proper, the antennæ, shorter then the head, are received into a cavity situated under the eyes, and are almost covered by the second joint, which is large, dilated, in the form of an almost triangular palette, and projects in the manner of an auricle, whence the name of *Dermeste à oreilles*, given to the most common species by Geoffroy(3). The palpi are not salient.

2. Those in which the antennæ, composed of eleven joints, are filiform, or merely a very little thicker near the extremity, and at least nearly as long as the head and thorax.

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(1) Regn. Anim., III, p. 268.

(2) *Parnus acuminatus*, Fab.; Panz., Faun. Insect. Germ., VI, 8;—*Dryops picipes*, Oliv., III, 41, 1, 2.

(3) Latr., Gen. Crust. et Insect., II, 55; Schœnh, Synon. Insect., I, ii, p. 116. The *Dryops Dumerilii* presents some differences in the length of the legs, the form of the antennæ and thorax, which have induced Doctor Leach to form a separate genus—*Dryops*—for it. The other species re-enter *Parnus*.

Elmis, Lat.—*Limnius*, Illig.

They are found in water, under stones, or on the leaves of the Nymphæa(1).

3.. Those in which the always very short antennæ consist of but six or nine joints, and terminate in an almost solid, oval, or nearly globular club.

Macronychus, Müll. Germ.

These Insects have five distinct joints in the tarsi, an oblong body, and antennæ of six segments, the last of which—perhaps composed of three—forms an oval club; they can be folded under the eyes(2).

Georissus, Lat. Gyll.—*Pimelia*, Fab.

Here the tarsi consist of but four joints; the body is short, turgid and almost globular, and the abdomen embraced by the elytra; the antennæ are composed of nine joints and terminate in a round club formed by the three last(3).

FAMILY V.

PALPICORNES.

In our fifth family of pentamerous Coleoptera, as in the fourth, we observe antennæ terminating in a club, usually perfoliaceous, but consisting of nine points at most in all, and inserted under the lateral and projecting edges of the head; they are never much longer than the latter and the maxillary palpi, and frequently even shorter than the last mentioned organs. The mentum is large and scutiform.

The body is usually ovoid or hemispherical, convex or arched. The legs in several are adapted for natation, and then consist of but four very distinct joints, or of five, the first of which is much shorter than the second; all the joints are entire.

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(1) Latr., Ib., II, p. 49; Schœnh., Ib. I, ii, p. 117; Gyllenh., Insect. Suec. I, p. 551.

(2) *Macronychus quadrituberculatus*, Müll.; Illig., Mag., V; Lat., Gener. Crust. et Insect., II, p. 58; *Parnus obscurus*, Fab.; Germ., Insect. Spec. Nov., I, p. 89.

(3) *Pimelia pygmæa*, Fab., *Georissus pygmæus*, Gyll., Insect. Suec., I, iii, p. 675; *Trox dubius*, Panz., Faun. Insect. Germ. LXII, 5.

Those in which the legs are natatory, the first joint of the tarsi is much shorter than the following ones, and the maxillæ are entirely corneous, will form our first tribe, that of the HYDROPHILII, which embraces the genus

HYDROPHILUS, Geoff.

Linnæus merely made these Insects a division (the first) of his genus *Dytiscus*, but their anatomy is essentially different. The alimentary canal of the Hydrophili is very analogous in its contexture and length, which is more than four or five times that of the body, to that of the Lamellicornes, and only approximates to the same canal of the carnivorous Insects with respect to the biliary vessels. They neither have the natatory bladder nor excrementitious apparatus which characterize the Hydrocanthari. In the females only, this apparatus is replaced by organs which secrete the matter that is to form the cocoon that encloses the ova, and to produce it their anus is furnished with two fusi. Finally, the male organs of generation have the closest affinity with those of the Clavicornes(1).

In some, where the body is oval, oblong and depressed, or elongated and narrow, the thorax scabrous and narrowed posteriorly, the tibiæ are slender and furnished with small spurs, and the tarsi filiform, slightly ciliated and terminated by two strong hooks; the antennæ—always composed of nine joints—terminate in a slightly perfoliaceous or nearly solid club, almost in the form of a reversed cone, and the extremity of the mandibles is entire, or ends in a single tooth. They are all very small, swim but seldom or badly, and inhabit stagnant waters, from which they occasionally remove, to conceal themselves under stones or in the earth. They compose the family of the *Helophoridea* of Leach, a name which reminds us of the genus *Elophorus* of Fabricius.

Here the length of the maxillary palpi does not surpass that of the antennæ or is even less. The epistoma is entire or without any notable emargination.

Sometimes the maxillary palpi are terminated by a thicker and oval joint.

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(1) "The conformation and structure of the male organs of generation in the Palpicornes fully justify the position in the entomological series, assigned to them by M. Latreille."—Leon Dufour, Ann. des Sc. Nat., VI, p. 172.

Elophorus, Fab.—*Silpha*, L.—*Dermestes*, Geoff.—*Hydrophilus*, De Geer.

The body oval, and the thorax transversal; the eyes but slightly prominent(1).

Hydrochus, Germ.—*Elophorus*, Fab.

The Hydrochi are only distinguished from the preceding subgenus by their narrow and elongated form, their thorax, which has the figure of a long square, and the prominence of their eyes(2).

Sometimes the maxillary palpi are subulate or terminate in a more slender joint, short and conical,

Octhebius, Leach, Germ.—*Elophorus*, Fab.—*Hydræna*, Illig., Lat.

The thorax is nearly semi-orbicular(3).

There, the maxillary palpi, terminated by a fusiform joint, larger than the penultimate and pointed at the end, are much longer than the antennæ and head. The epistoma is strongly emarginated. Their appearance otherwise is that of the Octhebii.

Hydræna, Kugel. Leach(4).

In the other Hydrophili the body is ovoid or almost hemispherical and generally convex or arched, and the thorax always smooth and wider than it is long; the tibiæ are terminated by strong spurs, and the tarsi most frequently ciliated. The extremity of their mandibles is bidentated. They embrace the family of the *Hydrophilidea*, Leach, or the genus Hydrophilus, Fab.

Some have but six joints in the antennæ; their epistoma is emarginated. Such are those which form the

Spercheus, Fab.(5)

In the following the antennæ are always composed of eight or nine joints, and the epistoma is entire, or on the anterior margin slightly concave.

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(1) The Elophori of Fabricius, those species excepted which belong to the following subgenera.

(2) *Elophorus elongatus*, Fab.;—*E. crenatus*, Id.;—*E. brevis*, Gyllenh. See Germ., Insect. Spec. Nov., I, p. 90.

(3) *E. pygmæus*, Fab.;—*Hydræna riparia*, Lat.;—*Hydræna margipallens*, Lat.; *Elophorus marinus*, Gyll.; see Germ., Ib., p. 90.

(4) *E. minimus*, Fab. Gyll.; *Hydræna riparia*, Kugel.; *H. longipalpis*, Schœnh., Germ., Faun. Insect., Eur. VIII, 6. For the other species, see Germ., Insect. Spec. Nov., I, p. 93.

(5) *Spercheus emarginatus*, Fab.; Panz., Faun. Insect. Germ., XCI, 4.. M.

A species transmitted to us by our friend Doctor Leach presents such singular characters that we have been induced to consider the Insect as the type of a new subgenus(1) the

Globaria, Lat.

So named because its body is almost spherical and laterally compressed, and because it appears susceptible of forming a ball, like an Agathidium. Its antennæ appear to me to be composed of but eight joints, of which the fifth is dilated into a spine at the internal side, the sixth forms a reversed and elongated cone, the seventh cylindrical, and the last or the eighth conical; these latter joints form an almost cylindrical and greatly elongated club, which terminates in a point. The maxillary palpi are a little shorter than the antennæ. The eyes are large and prominent. The thorax is almost semilunar. The elytra completely clasp the abdomen. The pectus is destitute of a sternal spine. The extremity of the four posterior tibiæ is furnished with a bundle of setæ almost as long as the tarsus. The scutellum is small, triangular, elongated, and narrow.

The only species known, *G. Leachii*, is small, and foreign to Europe. I believe it is from South America.

All the remaining Hydrophilii have nine joints in their antennæ; the club is oval or ovoid. The body is not susceptible of being contracted into a ball.

In the largest species, the two intermediate joints of the antennal club, or the seventh and eighth, are reniform or irregularly lunate, obtuse at one end, prolonged, arcuated, and pointed at the other, with a remarkable space between them; the first of this club is cupulate and most prolonged anteriorly. The middle of the sternum is elevated into a carina, and terminated posteriorly in a point more or less long, and very acute. The maxillary palpi are longer than the antennæ; their last joint is shorter than the penultimate. The tarsi, particularly the last, are compressed, fringed with hairs or cilia along their internal side, and terminated by two hooks, ge-

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Bourdon, a French naturalist who is now exploring Colombia, first discovered this species in the vicinity of Paris.

(1) It would seem to come more naturally near that of Berosus, Leach; but on account of the number of the antennal segments, I think it best to place it directly after Spercheus. This order, however, might be reversed by commencing with those subgenera which have nine joints in the antennæ, and ending with those in which there are three less, or with Globaria and Spercheus.

nerally small, unequal, and unidentated inferiorly. The scutellum is tolerably large. These species compose the genus

HYDROPHILUS, Geoff. Fab. Leach.—*Dytiscus*, Lin.

Here the sternal spine is strongly prolonged behind. The last joint of the two anterior tarsi of the males is dilated in the form of a triangular palette. The scutellum is large. They form the *Hydrous* of M. Leach(1).

The larvæ resemble a sort of soft, conical, and elongated worms, furnished with six feet, and a large squamous head, more convex underneath than above, armed with strong and hooked mandibles. They respire by the posterior extremity of the body, are very voracious, and do great injury to fish ponds by devouring the spawn.

H. piceus, Fab.; Oliv., Col. III, 39, 1, 2. An inch and a half long; oval; of a blackish-brown, polished, or as if covered with a varnish; antennal club partly reddish; some slightly marked striæ on the elytra, the posterior extremity of which is rounded laterally, and prolonged into a small tooth at the internal angle.

It swims and flies well, but walks badly. When held loosely in the hand, its sternal spine sometimes inflicts a wound.

The anus of the female is provided with two fusi, by means of which she constructs an ovoid cocoon, surmounted with a point, resembling an arcuated brown horn. Its external tissue is a gummy paste, which, though fluid at first, subsequently hardens, and becomes impervious to water. The ova it contains are arranged symmetrically, and kept in situ by a sort of white down. These cocoons float on the water.

The larva is depressed, blackish and rugose, and has the faculty of throwing back its brown, smooth, round head. This enables it to capture the little Mollusca which navigate the surface of the water, its back serving as a point d'appui or anvil on which it mashes the shell in order to devour the animal it contains. The body of these larvæ becomes flabby as soon as they are caught. They swim with great facility, and are provided with two fleshy appendages beneath the anus which serve to maintain them on the surface of the water, head downwards, when they come there to respire. According to M. Miger, to whom we are indebted for these observations—Ann. du Mus. d'Hist. Nat. XIV, 441—the larvæ of other Hydrophilii are deprived of these appendages, and neither swim nor suspend themselves like those of which we have been speaking. The females of these species swim with difficulty, and carry their ova under the abdomen enclosed in a silken web; but these species belong to the last subgenera of this tribe.

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(1) Zool. Miscel., III, p. 94.

The *Hydrophilus* proper of Leach consists of species in which the tarsi are identical in both sexes, and not dilated, the pectoral spine terminates with the poststernum, and in which the scutel is proportionally smaller(1).

In all the following Hydrophilii, the two intermediate joints of the antennal club are exactly transversal, of a regular form, not prolonged into a tooth at either extremity, and without any space between them; the last is obtuse or rounded at the end. The pectus exhibits neither carina nor spine. The tarsi are less, or not at all fitted for natation, but slightly or not ciliated, and terminated by large, equal, and simple hooks.

Those in which the maxillary palpi are hardly longer than the antennæ, with the last joint shorter than the preceding one, and cylindrical, in which the body is low, and the elytra are truncated at the extremity, or very obtuse, form the genus

LIMNEBIUS, Leach(2).

Those, in which the maxillary palpi are hardly longer than the antennæ, with the last joint as long as the preceding one or longer, and almost oval, and in which the body is convex, are comprised by the same English savant in two genera. In one of them, the

HYDROBIUS, Leach,

The eyes are depressed or but slightly convex; the anterior extremity of the head is not abruptly narrowed, and the base of the thorax is as wide as that of the elytra(3). In

BEROSUS, Leach,

On the contrary, the eyes are very prominent, the anterior extremity of the head is narrowed abruptly, and the base of the thorax is narrower than that of the elytra. The body is very convex(4).

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(1) To the HYDROUS, Leach, besides the *piceus*, refer the following species of Fabricius: the *ater*, *olivaceus*, *rufipes*, &c. Those, which the latter calls *caraboides*, *ellipticus*, &c., are Hydrophili properly so called of Leach.

(2) *H. griseus*, *truncatellus*, Fab.

(3) The Hydrobii *scarabæoides*, *melanocephalus*, *orbicularis*, &c.

(4) *H. luridus*, Fab.

Our second tribe or the SPHÆRIDIOTA, consists of terrestrial Palpicornes, with tarsi composed of five very distinct joints, the first of which is at least as long as the second. The maxillary palpi are somewhat shorter than the antennæ, with the third joint longer, inflated and in the form of a reversed cone. The maxillary lobes are membranous.

The body is nearly hemispherical, the posterior extremity of the præsternum is prolonged into a point, and the tibiæ are spinous; those that are anterior are palmated or digitated in the large species. The antennæ always consist of nine joints, or of eight, if the last be considered as an appendage of the penultimate(1).

These Insects are small, and inhabit cow-dung and other excrementitious matters; certain species are found near the shores of rivers, &c. They compose the genus

SPHÆRIDIUM, Fab.

From which, however, we must separate several species, a division already effected by Olivier. Dr Leach only considers as such those in which the anterior tarsi of the males are dilated. Such is

> *S. 4-maculatum; Dermestes scarabæoides*, L.; Oliv., Col. II, 15, 1 and 3, II, 11. It is of a shining black and smooth; the scutellum is elongated, and the legs are very spinous; a blood-red spot at the base of each elytron, and their extremity reddish. In some individuals these spots diminish or disappear.

The species, in which the tarsi are similar in both sexes, and whose antennal club is closely imbricated, compose the genus *Cercydion*(2) of Leach. The Sphæridia might be divided into several other sections by characters drawn from the form of the tibiæ, and the disposition of their spines or dentations, a division which would facilitate the study of the species, that seem to have been improperly multiplied(3).

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(1) See *Elater* and several other genera of the Coleoptera.

(2) The Sphæridia *unipunctatum, melanocephalum*, &c.; Zool., Miscell., III, p. 95.

(3) For the other species, see Olivier, Schœnherr, Gyllenhal, Dejean, &c.

FAMILY VI.

LAMELLICORNES.

In our sixth and last family of pentamerous Coleoptera, we find the antennæ inserted into a deep fossula under the lateral margin of the head; they are always short, usually consist of nine or ten joints, and are always terminated in a club usually composed of the three last, which are lamellar, sometimes flabelliform or disposed like the leaves of a book, opening and closing in a similar way, sometimes concentrically contorted and fitting in each other, the first or inferior then being semi-infundibuliform and receiving the others, and sometimes arranged perpendicular to the axis and forming a sort of comb.

The body is generally ovoid or oval, and thick. The exterior side of the two anterior tibiæ is dentated, and the joints of the tarsi, with the exception of those of some males, are entire and without brush or pellet beneath.

The anterior extremity of the head most commonly projects or is dilated in the manner of an epistoma. The mentum is usually large, covers the ligula or is incorporated with it, and bears the palpi. The mandibles of several are membranous, a character observed in no other coleopterous Insects. The males frequently differ from the females, either by prominences on the thorax or head in the form of horns or tubercles, or by the largeness of their mandibles.

This family is very numerous, and with respect to the size of the body, the variety of forms exhibited in the head and thorax, sexually considered, is one of the most beautiful of the order, and frequently also as regards the species, which in their perfect state live upon vegetable substances, by the splendour of the metallic colours with which they are ornamented. Most of the other species, however, feeding on decomposed vegetable aliment, such as dung, tan, or excrementitious matters, are usually of one uniform black or brown hue. Some of the Coprophagi, however, do not yield even

They are all furnished with

is long, almost semicylindrical, soft,
tish, and divided into twelve annuli,
; the head is squamous and armed with
Each side of the body is furnished with
posterior extremity is thicker, rounded and
doubled under it, so that the back being arcu-
the animal cannot extend itself in a straight
badly on a level surface, and falls backwards or
at every instant. An idea of their form may be
from that of the larva, so well known to gardeners
name of *ver blanc*, which is that of the *Melolontha*
aris(1).

Some of them require three or four years to become pupæ; they construct in their place of residence an ovoid shell, or one resembling an elongated ball, composed of earth or the debris of substances they have gnawed, the particles of which are cemented by a glutinous matter produced from their body. Their aliment consists of the dung of various animals, mould, tan, and roots of vegetables, frequently such as are necessary to man, of which they sometimes destroy immense quantities, to the great loss of the cultivator of the soil. The tracheæ of these larvæ are elastic, while those of the perfect Insect are tubular. There is also a remarkable difference in the nervous system in these two states. The ganglions are less numerous and more closely approximated in the perfect Insect, and the two posterior ones give off numerous radiating filaments. According to the observations of M. Marcel de Serres on the eyes of Insects, those of most of the Lamellicornes present peculiar characters, which approximate their organization to that of the Tenebrionites, Blattæ, and other lucifugant Insects.

The alimentary canal is generally very long, particularly in the Coprophagi, and contorted round itself; the chylific ventricle is studded with papillæ, which M. Dufour has ascertained to be bursæ, intended for retaining the alimentary fluid. The biliary vessels in number, and the manner of their insertion, resemble those of the carnivorous Coleoptera, but are much longer and more slender.

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(1) Our common *grubs*, which are so abundant in dung-hills, gardens, &c., are larvæ of various species of Lamellicornes. *Am. Ed.*

We will divide this family into two tribes(1). In the first or that of the SCARABÆIDES, we find the antennæ terminating in a foliaceous and generally plicatile club, and composed in others of joints that fit into each other, either in the form of a reversed cone or nearly globular. The mandibles are identical or almost similar in both sexes, but the head and thorax of the males exhibit peculiar projections or eminences; sometimes also their antennæ are more developed. This tribe(2) corresponds with the genus

SCARABÆUS, Lin.

The alimentary canal is generally much longer than that of the Lamellicornes of the following tribe or the Lucanides, and the œsophagus is proportionally much shorter. The adipose tissue, or the epiploon, is generally almost reduced to nothing, whilst here it is well marked. But it is chiefly by the genital apparatus of the males that the Scarabæides are distinguished, not only from the latter, but also from all other Pentamera. Their testes, according to the observations of M. Dufour, consist of spermatic capsules—tufts according to M. Cuvier—which are tolerably large, very distinct and pediculated; the number varies according to the genus.

The larvæ—Cuv., Règn. Anim.—have a cylindrical stomach surrounded by three ranges of little cæca, a very short small intestine, an extremely thick, turgid colon, and a moderate rectum.

We will divide this genus into several small sections established on characters drawn from the organs of manducation, antennæ, and habits; divisions, the distinction of which has been confirmed by the researches of M. Dufour.

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(1) The anatomy is so different, according to M. Dufour, that these two tribes should constitute as many families. The sections would then become tribes and some of their divisions so many principal genera—*Copris*, *Aphodius*, *Geotrupes*, *Scarabæus*, *Rutela*, *Melolontha*, *Glaphyrus*, and *Cetonia* for the first tribe.

(2) In thus retaining the primitive extent of this division, we have acted in conformity with our first edition; we still think, however, that although we may reject several of the genera established in modern times, there are some that must be received; such in general are those of Fabricius.

The Coprophagi or the Scarabæides of our first section, usually have their antennæ composed of nine joints, and of eight in the others, the three last forming the club. The labrum and mandibles are membranous and concealed. The terminal lobe of the maxillæ is also of the same nature, wide and arcuated at the superior margin and curved inwards. The last joint of the maxillary palpi is always the largest and almost oval or nearly cylindrical; but the same of the labial palpi is almost always more slender than the preceding ones, or very small. Behind each of the latter palpi there is a membranous projection in the form of a ligula. The mentum is emarginated. The sternum exhibits no particular prominence, and the hooks of the tarsi are always simple. The anterior tarsi are frequently wanting in several, either ab ovo or because they are deciduous.

The length of the alimentary canal is always very great; occasionally (as in *Copris lunaris*) ten or twelve times that of the body. The chylific ventricle occupies the largest portion of it, is studded with conoid papillæ, is closely folded together and kept in this state of agglomeration by numerous tracheal bridles. The intestine is filiform and terminates by an inflation. The testes of the Coprophagi, dissected by M. Dufour, appeared to him to consist of six orbicular, slightly depressed spermatic capsules, usually united by tracheæ in one bundle, each placed on a tubular and tolerably long pedicle, which terminates in a short vas deferens. There is but one pair of vesiculæ seminales; they are very long, filiform, and in numerous folds.

This first section corresponds to the third division of the genus Scarabæus, Oliv., or to that of Copris, but with the addition of some of the Scarabæides—*Aphodius*—of that naturalist.

In some, the two intermediate legs are more remote at base than the others; the labial palpi are very hairy, with the last joint much smaller than the others, or even indistinct; the scutellum null or extremely small, and the anus exposed.

Coprophagi of this division peculiar to the eastern continent, with a rounded body, usually depressed above or but slightly convex, similar or but little different, and without horns in both sexes; in which the antennæ of nine joints terminate in a foliaceous club; without scutellum, or sutural hiatus indicating its place; in which the four posterior tibiæ, usually furnished with ciliated or hairy fringes, are slender, elongated, not dilated at the extremity, or but slightly so, truncated obliquely, and terminated by a single stout and spiniform or acuminated spur; and finally, in which the epistoma is more or less lobate or dentated, form the genus

ATEUCHUS, Web. Fab.,

Since, however, restricted to those species in which the exterior margin of the elytra is straight, or unemarginated and without a sinus near their base exposing the corresponding portion of the superior margin of the abdomen. The tibiæ and tarsi of the four last legs are furnished with long hairs; the four first joints of the tarsi are generally longer than in the others. The first joint of the labial palpi is nearly cylindrical, or in the form of a reversed cone. The epistoma is most commonly divided into three lobes or festoons, and its contour presents six teeth.

These Insects, which M. Mac Leay, Jun., in his ingenious *Horæ Entomologicæ*, I, p. 184, designates by the generic appellation of *Scarabæus*, as being the name originally bestowed upon them by the Latins(1), and of which in the same work—part II, p. 497—he gives an excellent Monograph, conceal their ova in balls of dung, and even of human fæces, so similar to large pills that some authors have given them the name of *Pilularia*. They roll them along with their hind feet, and frequently in company, until they find a hole fitted to receive them, or a soil in which they can bury them.

Two species of Ateuchus were worshipped by the ancient Egyptians, and formed a part of their system of hieroglyphics. They are sculptured in various positions, and sometimes of gigantic dimensions, on all their monuments. They were also figured separately and on the most precious materials, such as gold; they used them as seals and as amulets, which were suspended to the neck and buried with the mummies. The Insect itself has been found in some of their coffins(2). The

A. sacer; *Scarabæus sacer*, L.; Oliv., Col. I, 3, VIII, 59, which is found not only in all Egypt but in the south of France, in Spain, Italy, and the south of Europe generally, has hitherto been considered the object of this superstitious distinction; but another species discovered in Sennar by M. Caillaud of Nantes, appears from its more brilliant colours, and the country in which it is found, the original residence of the Egyptians, to have first attracted their attention. The latter; which I have named the *Ateuchus des Egyptiens*—Voy. à Meroé, au fleuve

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(1) The *Heliocantharos* of the Greeks.

(2) See my memoir on the Insects painted and sculptured on the ancient monuments of Egypt, and the works of M. de Champollion, Jun.

Blanc, IV, p. 272, Atl. d'Hist. Nat. et d'Antiq., II, lviii, 10, is green with a golden tinge, while the former is black. The epistoma has six dentations in all, but here the vertex presents two little eminences or tubercles, while that of the other or the *A. des Egyptiens* exhibits a more slight and elongated, smooth, and very glossy projection. The thorax, except in the middle of its back, is entirely punctured and even scabrous on the sides, with dentated margins. The intervals of the elytral striæ are besides finely scabrous, with numerous and tolerably wide, deep punctures. The internal side of the two anterior tibiæ presents a series of small teeth. In the *Ateuch. sacer* this same side usually presents two stout teeth.

Ateuchi—the *S. Æsculapius*, and another species, the *Hippocrates*—in which the thorax and abdomen are shorter, rounder, and more convex, and in which the first joint of the labial palpi is also shorter, wider, and in the form of a reversed triangle, form the genus *Pachysoma* of Kirby(1).

Those in which the exterior side of the elytra is strongly emarginated near the base, are now the

GYMNOPLEURUS, Illig.

The four posterior tibiæ are usually simply ciliated or furnished with small spines, and the last joint of their tarsi is as long as all the preceding ones taken together, or longer. The first joint of the labial palpi is dilated internally, and almost triangular. There is a fossula on each side of the thorax(2).

Other Coprophagi, very analogous to the preceding ones, and also placed by Fabricius among the Ateuchi, are distinguished from them by the intermediate tibiæ, the extremity of which, as well as that of the two last, frequently dilated or clavate, presents two spines or spurs. The epistoma, in several, exhibits but four or two teeth. The first joint of the labial palpi is always larger than the second, and dilated externally. The third and last joint is distinct. First comes

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(1) In addition to the Ateuchi above mentioned, refer to the same subgenus, the *A. laticollis*, *variolosus*, *semipunctatus*, *miliaris*, *sanctus*, &c., of Fabricius. See Mac Leay, op. cit., and the Entomog. Imp. Russ., where several species of this and the following subgenera are exactly delineated.

(2) The Ateuchi *sinuatus*, *pilularius*, *flagellatus*, *Leei*, *Kœnigii*, *cupreus*, *profanus*, &c., Fab.; the *Sc. fulgidus*, Oliv., &c. The Ateuchi of Fabricius, proper to America, belong to other subgenera. M. Mac Leay—Hor. Entom., I, pars II, p. 510—still retains the Gymnopleuri, the Ateuchi, or his Scarabæi, but forms a section of them, of which he points out the species.

Sisyphus, Lat.

The Sisyphi differ from the other Coprophagi in their antennæ, which consist of but eight joints, and in their abdomen, which is triangular. The four last legs are long and narrow, their thighs clavate. The body is short and thick; no scutellum(1).

Circellium, Lat.

The body hemispherical and convex; the abdomen almost semicircular, and the lateral edges of the thorax straight or not dilated, or but slightly, in the middle. No scutellum. Five or six dentations in the epistoma(2).

Coprobius, Lat.

No scutellum; the body ovoid, not arched, or but slightly so; middle of the lateral margins of the thorax dilated into an obtuse or rounded angle, abdomen nearly square; epistoma bidentate. These Insects are more particularly proper to the western continent(3).

Those species, in which the four posterior tibiæ are proportionally shorter, dilated, or remarkably widened at the extremity, and the first joints of the tarsi are broader, form the genus *Chæridium* of MM. Lepeletier and Serville—Encyc. Méthod.;—we will also unite to the Coprobii the *Hyboma* of the same authors.

Another subgenus allied to the preceding, the species of which are also proper to America, that which they call *Æschrotes*, but which had been previously published by Dalman—Ephem. Entom., 1824—under another name, that of

Eurysternus, Dalm.

Differs from the preceding subgenera in the presence of a scutellum. The body is also an oblong oval, and plane above; the sides of the thorax are obliquely and abruptly truncated. The intermediate coxæ are directed longitudinally with the body, and parallel to its sides.

In all the following Coprophagi, the four posterior tibiæ are always dilated at their extremity, and almost in the form of an elongated triangle; the intermediaries, as in the last, terminate in two stout spurs or spines; but the head or thorax, or both, in the males, presents horns or projections which distinguish them from the females. In several, the three last joints of the antennæ are semicupular and concentrically piled or fitted into each other. They compose the genera *Onitis* and *Copris* of Fabricius.

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(1) *Ateuchus Schæfferi*, Fab.;—*Sc. longipes*, Oliv., and some undescribed species from the Cape of Good Hope.

(2) The Ateuchi, *Bacchus*, *Hollandiæ*, Fab.

(3) The *A. volvens*, *violaceus*, *triangularis*, 6-*punctatus*, &c., Fab.

Two subgenera with a foliaceous antennal club present a character which, in this section, is exclusively peculiar to them: the third joint of the labial palpi is but slightly or not at all distinct, and the second is larger than the first.

ONITICELLUS, Zieg. Dej.

The body is oblong and depressed; the thorax large, nearly oval, and almost as long as it is wide, and always smooth. The scutellum is distinct. Simple elevated lines or tubercles on the head distinguish the males from the females(1).

ONTHOPHAGUS, Lat.—*Copris*, Fab.

No scutellum. Their body is short, thorax thick, broader than long, either almost semi-orbicular or nearly orbicular, but strongly emarginated or truncated before. The head, and frequently the thorax, of the male is furnished with horns.

O. taurus; S. taurus, L.; Oliv. Col. I, 3, viii, 63. Small; black; two semicircular horns on the head of the male; two transverse and elevated lines on that of the female. In cow-dung.

O. nuchicornis; S. nuchicornis, L.; Panz., Faun. Insect. Germ. I, and XLIX, 8. Small; black; elytra grey with little black spots; a compressed laminiform projection terminating in an almost straight point on the hind part of the head of the male; two elevated and transverse lines on that of the female; a tubercle on the anterior of the thorax. With the preceding.

Africa and India produce several other species, some of which are very brilliant, but they are all small(2).

Two subgenera presenting a scutellum, or sutural hiatus indicating its place, in which the anterior legs are frequently destitute of tarsi, and frequently also longer, more slender and arcuated in the males, are distinguished from all other Coprophagi by the form of their antennal club; its first joint, or the seventh of the whole number, is semi-cuculliform and receives the following one, a portion of which at least is concealed and is shaped like a horse-shoe; the third or last is in the form of a reversed cup. The thorax is large, and usually presents two little fossulæ near the middle of the posterior margin. In

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(1) Dej., Catalogue, &c., p. 53.

(2) Dej., Ib. See Lat., Gener. Crust. et Insect., II, p. 83.

Onitis, Fab.

The second joint of the labial palpi is the largest, and the scutellum, though very small and depressed, is still visible. The anterior legs are generally longer, more slender and arcuated in the males. The tarsi are usually deficient, and the thorax, that of a small number excepted, is without horns(1).

Phanæus, Mac Leay.—*Lonchophorus*, Germ.—*Scarabæus*, L.—*Copris*, *Onitis*, Fab.

Where the first joint of the labial palpi is the largest and dilated on the internal side. A simple sutural hiatus indicates the place of the scutellum. The males differ greatly from the females in the horn-like prominences of their head and thorax; but the respective length of the legs is the same.

Several large and beautiful species of Copris, Fab., peculiar to America, compose this subgenus(2).

Copris, Geoff. Fab.—*Scarabæus*, Lin.

This subgenus, or Copris properly so called, is at present composed of those species only, whose antennæ are terminated by a trifoliate club; in which the four posterior tibiæ are strongly dilated and truncated at the extremity; that have neither scutellum nor hiatus; in which the body is always thick, and differs above according to the sex, and whose labial palpi are composed of three distinct joints, of which the first is the largest, almost cylindrical and not dentated on the inner side.

The largest species belong to those parts of Africa or India that are situated between the tropics or in their immediate vicinity.

C. lunaris; *S. lunaris*, L.; Oliv., Ib., v, 36. Eight lines in length; black, very glossy; the head, emarginated at the anterior edge, is provided with a long horn, longer and pointed in the male, short and truncated in the female—*S. emarginatus*, Oliv., Ib., viii, 64—thorax truncated before, with a horn on each side; elytra deeply striated(3).

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(1) See Encyc. Méthod., article *Onitis*.

(2) See Encyc. Méthod., article *Phanée*, and particularly the Hor. Entom., I, p. 124. The author of the latter refers to it the following Scarabæides of Olivier: *Sc. bellicosus*, *lancifer*, *jasius*, *mimas*, *beelzebut*, *festivus*, *carnifex*, &c.

(3) The Copris: *Antenor*, *Hamadryas*, *Midas*, *gigas*, *bucephalus*, *molossus*, *his-*

Like the Lamellicornes of the ensuing section, the last Coprophagi have all their feet inserted equidistant from each other, and a very distinct scutellum. The labial palpi are glabrous or but slightly pilose, and their third and last joint is larger, or at least longer than the preceding ones. The elytra completely envelope the contour of the abdomen, or form an arched roof to it, a character which approximates them to the Scarabæides of the following section. Independently of this, these Insects, with respect to their antennæ and legs, are closely allied to those of the preceding subgenus; but the sexual variations are less strongly marked, and frequently consist of mere tubercles. They are all small. Several species appear in the very beginning of Spring. They form two subgenera.

APHODIUS, Illig. Fab.—*Scarabæus*, Lin. Geoff.—*Copris*, Oliv.

In which the last joint of the palpi is cylindrical, and that of those attached to the labium somewhat more slender than the preceding ones, or at least not thicker. There is no appendage or corneous and dentated lobe to the inner side of the maxillæ. The body is rarely short, with the abdomen arched, and when these characters are present, the thorax is not transversely sulcated.

> *A. fimetarius*; *S. fimetarius*, L.; Panz., Faun. Insect. Germ., XXXI, 2. Three lines in length; black; elytra and a spot on each side of the thorax fulvous; three tubercles on the head; elytra with punctured striæ(1).

PSAMMODIUS, Gyll.

Where the last joint of the palpi is oval and the thickest and longest of the whole number, and in which the internal lobe of the maxillæ is corneous and bidentated. The body is short, the thorax transversely sulcated, and the abdomen inflated(2).

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panus, *nemetrinus*, *nemestrinus*, *sabæus*, *Jachus*, &c., of Fabricius; the *Ateuchus Tmolus*, Fischer, Entomog. Russ., I, viii, 1, 2, is a Copris.

(1) See Schœnherr, Synon. Insect., I, 1, p. 66; Panz., Ind. Entom., p. 7.

(2) The only one I refer to it is the *Psammodius sulcicollis*, Gyll., Insect. Suec. I, p. 9. The other species are true Aphodii. See Encyc. Méthod., article *Psammodie*.

The genus *Euparia*, established in the Encyc. Méthod., by MM. Lepeletier and Serville, belongs to this section, but as they have not completely described it, and I have never seen the Insect on which it is founded, I cannot assign its place. According to those gentlemen, the sides of the head are dilated and form a triangle. The posterior angles of the thorax are emarginated, and the humeral angles of the elytra are prolonged anteriorly into a point. The only species quoted is the *castanea*. These characters, and even the colour, induce me to suspect that this genus is closely allied to the *Eurysterne* of Dalman, which we have already mentioned.

This subgenus conducts us naturally to the first of the following section, that of the ARENICOLI. These Scarabæides, with the Aphodii and Psammodii, are the only ones whose elytra entirely cover the posterior extremity of the abdomen, so that the abdomen is completely concealed; but they are distinguished from the latter by several characters. The labrum is coriaceous, and most frequently juts out beyond the epistoma. The mandibles are corneous, and usually salient and arcuated. The terminal lobe of the maxillæ is straight, and has no inward curve. The third and last joint of the labial palpi is always very distinct, and at least almost as long as the preceding one. With some few exceptions their antennæ are composed of ten or eleven joints.

These Insects are also coprophagous, make deep holes in the ground, fly particularly during the evening, after sun-set, and counterfeit death when seized. According to M. Leon Dufour, the alimentary canal of *Geotrupes*, one of the principal subgenera of this section, is somewhat shorter than in *Copris*, and the stomach presents no vestige of papillæ(1).

Here—*Geotrupides*, Mac Leay—the labium is terminated by two lobes, or salient ligulæ, the mandibles are generally salient and arcuated; the labrum is either wholly or partially exposed, and the antennæ in most of them are composed of eleven joints. The body is black or reddish, and the elytra smooth or simply striated. The males generally have horns, or differ in other external characters from the females. They feed more particularly on excrementitious matters.

The antennæ of some are composed of nine joints.

ÆGIALIA, Lat.—*Aphodius*, Fab.

The labrum short, transversal, scarcely apparent and entire; terminal point of the mandibles bifid; internal lobe of the maxillæ corneous and bidentated; the body short and inflated; thorax transversal; abdomen gibbous; the four posterior tibiæ thick and incised, the two last terminated by two compressed and almost elliptical or spatuliform spurs; the two anterior tibiæ have no tooth on the inner side; the posterior thighs are the largest(2).

CHIRON, Mac Leay.—*Diosomus*, Dalm.—*Sinodendron*, Fab.

The Chirones, in their antennal club, which is rather semi-pectiniform than foliaceous, approach the Lamellicornes of the second tribe, where in fact they have been placed by M. Mac Leay; but in the ensemble of their other characters they belong to this section. Their labium is broad, ciliate, quadridentate, and completely exposed. Their mandibles are robust, in the form of an elongated triangle, and have two teeth on the inner side. The two maxillary lobes are coriaceous and without any kind of armature. The body is narrow, elongated, and almost cylindrical; the thorax is longitudinal and separated from the abdomen by a deep strangulation; the abdomen is elongated, and the anterior tibiæ are wide, digitated, and furnished on the inner side, after the spur, with a tooth, silky at the end. The thighs are lenticular, and the two anterior are the largest. There is a transverse range of small tubercles on the anterior extremity of the head(1).

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(1) See Ann. des Sc. Nat., III, p. 234.

(2) *Psammodius arenarius*, Gyll., Insec. Suec. I, p. 6; *Scarabæus globosus*, Panz., Faun. Insect. Germ., XXXVII, 2; *Aphodius arenarius*, Fab.

Those of others are composed of eleven joints(2).

Some are distinguished from all others by the antennal club in the form of a reversed cone, which consists of joints or leaflets contorted into a kind of funnel and fitting concentrically into each other, and by their mandibles, the inner side of which is entirely serriform, and which present underneath, particularly in the males, a projection or horn. In these individuals the thorax is deeply emarginated before, and its angles project considerably forwards. The abdomen is very short, almost semicircular, and the last legs near its extremity. The labial palpi are a little longer than the others; their second joint is elongated, and the two others are almost equal in length. The inner side of the maxillæ is furnished with hairs and cilia, in the form of little spines, and their terminal lobe is narrow and elongated. The mentum is triangular, and transversely truncated at its extremity. Such are those which form the

LETHRUS, Scop. Fab.

The species, but few in number, are peculiar to Hungary and the eastern part of Russia.

L. cephalotes, Fab.; Fisch., Entomog. Russ. Imp., I, p. 133, XIII, 1. This Insect, distinguished from the other species by its entirely black colour, and smooth thorax and elytra, according to professor Gothelf Fischer, is extremely noxious in cultivated grounds, as it attacks the scarcely visible buds and leaves of plants, and cuts them off with the trenchant forceps of its mandibles, a habit which in Hungary, where it does great injury to the vines, has caused it to be styled the *Schneider*, or Cutter. As the pectus projects greatly underneath the abdomen, and the hind legs seem to be inserted very near the anus, it is a good climber, and in descending moves backwards. After having amputated the heart of a plant, it descends with its prey, which it transports to its hole. Each of these holes, which are made in the earth, is occupied by a pair, but in the nuptial season a strange male frequently claims admittance. A furious combat is the consequence, during which the female closes the entrance of the domicil, and keeps continually pushing her companion forwards. The battle only ceases with the death or flight of the intruder. The same savant describes—Ibid., p. 136, 140—three other species hitherto unknown.

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(1) *Sinodendron digitatum*, Fab.; *Chiron digitatus*, Mac Leay, Hor. Entom., I, p. 107; *Diasomus digitatus*, Dalm., Ephem. Entom., I, p. 4.

(2) This supputation is sometimes doubtful, inasmuch as it is not always easy to distinguish the joint that precedes the club, and that it may, apparently, seem confounded with the first of the club itself. The base of the second also forms a sort of knot or rotula that may be taken for a joint.

In all the other Arenicoli the antennal club is composed of the ordinarily shaped leaflets, laid one on another, or like the leaves of a book. They form our subgenus Geotrupes, or the *Scarabæus*, Fab., from which the following subgenera have since been detached.

Those, in which the antennal club is oval or ovoid, and of which the edges of the leaflets are totally or partially exposed even when contracted, form two of them. In

Geotrupes, Lat.

Or Geotrupes properly so called, the labrum is a transverse square, entire or simply dentated; the mandibles are arcuated, highly compressed, dentated at the extremity, and frequently sinuous on the exterior side and the maxillæ furnished with a very thick fringe of hairs; the last joint of the maxillary palpi is not larger than the preceding one, while the same of the labial palpi is longer; the mentum is profoundly emarginated; the anterior tibiæ are elongated, their external side is furnished with numerous teeth, and the extremity on the opposite side with a single spur or spine; the epistoma is lozenge-shaped.

Sometimes the thorax of the male is armed with horns. They are the *Ceratophyus* of Fischer, or *Armidens*, Ziegler.

G. typhæus; S. typhæus, L.; Oliv., Col. I, 3, vii, 52. Black; three projecting black horns before the thorax of the male, of which the intermediate is the shortest; elytra striated. In high and sandy localities.

G. momus; S. momus, Fab. This species, discovered in Spain by count Dejean, differs from the Typhæus in the smoothness of the elytra; it is otherwise similar.

G. dispar; Ceratophyus dispar, Fisch., Entomog. Russ. Imp., II, xviii. A horn on the head and thorax. Italy and Russia.

Sometimes both sexes are destitute of horns. They are the Geotrupes proper.

G. stercorarius; Scarabæus stercorarius, L.; Oliv., Ib. V, 39. A shining black or deep green above, violaceous or golden green beneath; a tubercle on the vertex; dotted bands on the elytra, with smooth intervals; two indentations at the base of the posterior thighs.

G. vernalis; Scarab. vernalis, L.; Oliv., Ib., iv, 23. Shorter than the stercorarius, and approximating to a hemispherical figure; a violet or blue-black; antennæ black; elytra smooth.

OCHODÆUS, Meg.—*Melolontha*, Fab.

The labrum in this subgenus is strongly emarginated, and almost in the form of a heart truncated posteriorly. The mandibles are in the form of an elongated triangle, one of them terminating in a simple point, with a notch beneath, and the other in two obtuse teeth. The exterior lobe of the maxillæ is bordered with little spines or stout cilia hooked at the end and has two small horny and equal inner teeth; the other, or internal lobe, is formed by a pointed pencil of hairs. The last joint of their palpi is cylindrical, and much longer than the penultimate; the second of the labial palpi is larger than the others, and the following, or last, in the form of a truncated ovoid. There are but two teeth on the exterior side of the anterior tibiæ, and two spines may be observed on the extremity of the opposite side, of which the inferior is the smallest. The body is less elevated, in proportion, than that of the other Geotrupes, and is destitute of horns(1).

Those Geotrupes, in which the antennal club is large, orbicular or nearly globular, and whose first and last leaflet when contracted completely envelope the intermediate or tenth, or form a sort of box for it, form three subgenera. That of

ATHYREUS, Mac Leay,

Approximates to the Coprophagi in its intermediate legs, which are more remote at base than the others(2).

ELEPHASTOMUS, Mac Leay.

The Elephastomi are remarkable for their epistoma, which is dilated on both sides and prolonged anteriorly, in their middle, into an almost square lamina, thickest and forked at the end; and for the length of their maxillary palpi, which is almost thrice that of those attached to the labium. The mentum is profoundly emarginated, and the mandibles are dentated at the extremity(1).

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(1) *Melolontha chrysomelina*, Fab.; Panz., Faun. Insect. Germ., XXXIV, 2.

(2) Hor. Entomol., I, 1, p. 123.

BOLBOCERAS, Kirby.—*Odontæus*, Zieg.—*Scarabæus*, Lin. Fab.

Where, as in Ochodæus, to which they closely approximate, one of the mandibles is simple at the extremity, and the other dentated. The maxillary palpi are not much longer than the others, and there is no emargination in the mentum.

> *B. mobilicornis*; *Scarab. mobilicornis*, Fab.; Panz., Faun. Insect. Germ., XII, 2. Small; black above, fulvous beneath; the head armed with a very long, linear, slightly recurved and mobile horn; the thorax deeply punctured, canaliculated in the middle, and furnished anteriorly with four tubercles; elytra marked with dotted striæ; the body sometimes all fulvous—*S. testaceus*, Fab. Found in France.

One of the sons of that celebrated traveller and ornithologist, Le Vaillant, observing that Frogs and Toads are excessively fond of this Insect, procured numerous specimens by eviscerating those Reptiles(2).

Our first division of the Scarabæides Arenicoli is terminated by those in which the antennæ, as in the most of the subsequent Scarabæides, are composed of ten joints.

The last joint of their palpi is elongated. The maxillary lobes are membranous. The labrum is less salient than in the preceding, or projects but little. The mandibles are not at all or but very slightly dentated. The epistoma is short, either arcuated and rounded, or projecting into an angle. They are very small Insects, whose thorax is destitute of horns.

HYBOSORUS, Mac Leay.—*Carabæus*, *Geotrupes*, Fab.

The first joint of the antennæ in the form of a reversed and elongated cone; the intermediate joint of the club entirely enveloped by the two others, as in the last subgenera; the tibiæ narrow and elongated; the epistoma rounded anteriorly(3).

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(1) Hor. Entom., I, p. 121; *Scarabæus proboscideus*, Schreib., Lin. Trans., VI, p. 189.

(2) *Bolboceras australasiæ*, Kirb., Lin. Trans., XII, xxiii, 5;—the *Scarab. quadridens*, *cyclops*, and *lazarus*, Fab.

(3) Hor. Entom., I, 1, p. 120; *Geotrupes arator*, Fab.

Acanthocerus, Mac Leay.

First joint of the antennæ very large, dilated superiorly and laminiform; the edges of the intermediate leaflet of the club, when it is bent, are exposed. The tibiæ, the four last particularly, are lamelliform and cover the tarsi, folding over them when the leg is contracted. The epistoma tapers to a point or terminates in an angle. The thorax is almost semilunar(1).

There, or in our second division of the Arenicoli—*Trogides*, Mac Leay—the antennæ, scarcely longer than the head, are always composed of ten joints, the first of which is large and very hairy. The ligula is entirely concealed by the mentum. The labrum and mandibles are but little exposed, and the latter are thick. The palpi are short. The mentum is entirely pilose. The inner side of the maxillæ is armed with teeth. The cinereous or earth-coloured body is very scabrous or tuberculous above. The head is inclined, terminates in an angle or narrows to a point. The thorax is short, transversal, without a lateral border, sinuous posteriorly, with projecting anterior angles. The abdomen is large, arched, and covered with very hard elytra. The anterior legs advance, and their thighs cover the under part of the head. These Insects produce a stridulous noise by the reiterated and alternate rubbing of the pedicle of the mesothorax against the internal parietes of the thoracic cavity.

They are found in earth or sand, and appear to gnaw the roots of vegetables. They form the genus

Trox, Fab. Oliv.

From which, under the generic name of Phoberus, M. Mac Leay, Jun., has separated those in which the sides of the thorax are depressed, dilated and bordered with spines, and which are destitute of wings. On each side of the posterior edge of the thorax is a deep emargination; the epistoma is rounded anteriorly(2).

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(1) Mac Leay, Ib. p. 136; *A. æneus*, a species for the knowledge of which I am indebted to one of our most able naval engineers, and not less excellent entomologist, M. Lefebure de Cerisy. M. Mac Leay refers the *Trox spinicornis*, Fab., to the same genus.

(2) *Trox horridus*, Fab ; Mac Leay, Hor. Entom., I, 1, p. 137. The species of Trox, Fab., remain where they are. See this author, Olivier and Schœnherr.

The genera *Cryptodus* and *Mæchidius*, arranged by Mac Leay in his family of the Trogidæ directly after that of Phoberus, have the posterior extremity of the abdomen exposed, and nine joints in the antennæ, characters which appear to remove them from Trox. I suspect that the Machidii, from the form and emargination of the labrum and from some other characters, are allied to the Melolonthæ.

A third section, that of the Xylophili, will comprise the Geotrupes of Fabricius, and some of his Cetoniæ. Here the scutellum is always distinct, and the elytra do not cover the posterior extremity of the abdomen. The tarsial crotchets of several are unequal. The antennæ always consist of ten joints, the three last forming a foliaceous club, of which the intermediate leaflet is never completely concealed or encased by the two others. The labrum is not salient, and its anterior extremity at most is exposed. The mandibles are entirely corneous, and jut out beyond the sides of the head. The maxillæ are corneous or of a solid consistence, straight and commonly dentated. The ligula is covered by an ovoid or triangular mentum narrowed and truncated at its extremity, the angles of which are frequently dilated. All the legs are inserted at an equal distance from each other.

A first division will comprise the Geotrupes of Fabricius. The males differ from the females in particular projections resembling horns or tubercles on the head or thorax, or on both, and sometimes also in the form of the latter. The epistoma is small, triangular, and either pointed, or truncated and bidentated at the extremity. The labrum is almost entirely concealed. Here, the maxillæ terminate in a simple, coriaceous, crustaceous lobe, more or less pilose and without teeth; there, they are entirely squamous, pointed, and present but a small number of teeth, accompanied with hairs. The mentum is ovoid or in the form of a truncated triangle. There is no projection on the pectus. The tarsial crotchets are generally equal. The scutellum is small or moderate. Their colours verge on black or brown.

Sometimes the maxillæ are terminated by a coriaceous or crustaceous edentated lobe, simply pilose or furnished with spinuliform cilia.

Oryctes, Illig.—*Scarabæus*, Lin.

Where the legs differ but little in length, and the four posterior tibiæ are thick, strongly incised or emarginated, with an extremely wide extremity, which, in several, is as if stellated.

O. nasicornis; *S. nasicornis*, L.; Rœs., II, vi, vii. Fifteen lines in length; of a glossy maronne-brown; point of the epistoma truncated; a conical horn, more or less long, arcuated

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The Cryptodi are distinguished from all other Scarabæides by their mentum which almost completely covers the mouth beneath, and even by the labial palpi, situated, as well as the ligula, behind it. These two genera are established on Australian Insects which I have not seen.

posteriorly on the head; front of the thorax cut obliquely, with three teeth or tubercles on the elevated portion posterior to the section; elytra smooth. Found, together with its larva, in tan.

O. silenus; G. silenus, Fab.; Oliv., Col., I, 3, viii, 62, a—c. Smaller than the nasicornis; of a lighter but similar hue; a little recurved and pointed horn on the head of the male; a deep excavation in the middle of the thorax; the last joint of the two anterior tarsi inflated, and with two very unequal hooks; elytra finely and irregularly punctured(1). In

AGACEPHALA, Manh.

The anterior legs, at least in the males, are longer than the succeeding ones, and the four posterior tibiæ are slender or not thick, almost cylindrical, slightly dilated at the extremity, and without deep lateral incisures or emarginations.

The labrum is entirely concealed. The terminal lobe of the maxillæ is simply pilose. The antennæ consist of ten joints; the supputation of their number in the Encyc. Méthod., article Scarabées, which amounts to but nine, is erroneous.

I know two species, both from Brazil(2).

Sometimes the maxillæ, usually corneous or scaly, are more or less dentated. In

SCARABÆUS proper,—*Geötrupes*, Fab.

The body is thick and convex, and the outer side of the mandibles sinuous or dentated.

The equatorial countries of both hemispheres produce very remarkable species of this subgenus.

S. Hercules, L; Oliv., Col. I, 3, 1, xxiii, 1. Five inches long; black; elytra greenish-grey mottled with black; a recurved and dentated horn on the head of the male, and a second one, long, projecting and pilose beneath, with a tooth on each side on the thorax. South America. Some travellers call it the *Mouche cornue*(1).

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(1) Add the Geotrupes, *boas*, *rhinocerus*, *stentor*, &c. of Fabricius.

The genus *Orphnus*, Mac Leay, established on the *G. bicolor* of Fabricius, does not differ from the preceding. The anterior margin of the labrum is salient or exposed. The maxillæ are terminated by a bundle of spinuliform cilia, arcuated outwards, with a crustaceous triangular lobe. The antennal club is nearly globular. His genus *Dasygnathus*, placed by him in his family of the Dynastides, is unknown to us, but we presume, from the description of its characters, that it approaches the preceding and following genus.

(2) The *Ægeon* of Fabricius is perhaps congeneric.

S. dichotomus, Oliv., Ib. XVII, 156. A fine maronne-brown; a large bifurcated horn with cleft branches on the head; a second one, smaller, curved and bifid at the end, on the thorax of the male. The East Indies.

S. longimanus, L.; Oliv., Ib. IV, 27. Fulvous-brown; head and thorax destitute of horns and tubercles; the two anterior legs more than half as long again as the body, and arcuated. The East Indies.

S. punctatus; Oliv., Ib., VIII, 70. Black; punctured; no elevation in the shape of a horn in either sex; the epistoma truncated anteriorly, and the angles of the section slightly raised in the manner of teeth; two approximated tubercles on the middle of the head(2). The only species in France.

PHILEURUS, Lat.—*Geotrupes*, Fab.

The Phileuri only differ from the Scarabæi in their mandibles, which are straighter, destitute of sinus or teeth on the outer side, and in their depressed body, the thorax of which is dilated and rounded on the sides(3).

Our second division contains Scarabæides, closely allied to the preceding in some respects, but also closely approximating to various Melolonthæ, and particularly to the Cetoniæ, which they resemble externally, but from which they differ in the arrangement of the mouth; Fabricius and Olivier even arranged most of these Insects with them. Their body is generally shorter, more rounded, smoother than that of the Scarabæi, and decorated with brilliant colours. The head and thorax are identical, and without any particular projection in both sexes. The anterior margin of the labrum is almost always exposed or apparent. The maxillæ are entirely scaly, as if truncated at the extremity, and furnished on the inner side with five or six strong teeth. The mentum is proportionally shorter and wider than that of the same Coleoptera, and less narrowed superiorly. The mesosternum is frequently prolonged into a horn or blunt point, extending between the second legs and even beyond them. The scutellum is usually large. The tarsial hooks are generally unequal. With the exception of a small number, these Xylophili are peculiar to the equatorial countries of the western continent.

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(1) This species is the type of the genus *Dynastes*, Kirby. The *S. Actæon* forms another, that of *Megasoma*. See Lin. Trans., XIV.

(2) The Geotrupes of Fabricius, with the exception of the precited species, forming the genus *Oryctes*, and of the following one. [We have several species of this genus in the United States, among which should be particularly noticed the large and splendid *Sc. Tityus*, the *Antæus*, &c. *Am. Ed.*]

(3) *G. dydimus, vulgus, depressus*, Fab. Certain undescribed species from Brazil and Cayenne, somewhat analogous to Sinodendron, have a thicker body, and connect the Phileuri with our Scarabæides, or the Geotrupes of Fabricius, a genus which has not been sufficiently studied with respect to the organization of the parts of the mouth.

Here, as in all the preceding Scarabæides, we find no axillary piece(1) filling the interval comprised between the posterior angles of the thorax and the exterior angles of the base of the elytra.

We will first speak of those subgenera in which the middle of the pectus presents no point or horn.

HEXODON, Oliv. Fab.

The body is almost orbicular and plane beneath; the head square and received into a deep emargination of the thorax; the outer margin of the elytra dilated and preceded by a small groove; the legs are slender, and the hooks of the tarsi very small and equal.

The labrum is not apparent. The antennal club is small. The maxillæ are strongly dentated(2).

CYCLOCEPHALA, Lat.—*Chalepus*, Mac L.—*Melolontha*, Fab.

The body ovoid; head free; elytra slightly bordered, without any lateral dilatation or groove; terminal joint of the anterior tarsi clavate, with unequal hooks, both bifid.

The anterior margin of the labrum is apparent. The mandibles are narrow, without any notable emargination or sinus on the outer side, and project but slightly outwards(3).

In the following subgenera, the sternum projects between the second pair of legs in a conical point, more or less long, pointed or rounded at the extremity.

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(1) A lateral portion of the sternum larger and thicker than usual, and which perhaps corresponds to that small rounded scale (the *tegula* of some authors) found at the origin of the superior wings of Hymenoptera. See the Mém. sur le thorax des Insectes, by M. Audouin.

(2) See Oliv., and Lat., Gener. Crust., II, p. 106.

(3) The Melolonthæ *geminata*, *barbata*, *castanea*, *signata*, *ferruginea*, *melanocephala*, *pallens*, &c., of Fabricius. In the first, the mandibles are strong, arcuated, and hooked at the end. Those of the *M. signata*, *melanocephala*, &c., are smaller, straight, truncated, or obtuse at the end. The summit of the maxillæ and mentum is also furnished with hairs. From such characters we might form a separate subgenus of these and analogous species. They all belong to South America.

The anterior margin of the labrum is always apparent. The mandibles are generally crenulated or dentated on the outer side. The tarsial crotchets are unequal. In the

Chrysophora, Dej.

The posterior legs of the males are very large, the thighs very thick, the tibiæ arcuated and terminated at the inner angle in a stout point(1).

Rutela, Lat.—*Rutela*, *Pelidnota*, Mac L. Kirb.—*Oplognathus*, Kirb. Mac L.

No remarkable difference in the proportions of the legs in the two sexes; the mentum almost isometrical; the scutellum small or moderate; sternal point short and not reaching to the origin of the two anterior feet. The body is ovoid or oval(2). The

Macraspis, Mac L.—*Cetonia*, Fab.

Differs from Rutela in the proportions of the mentum which is evidently longer than it is broad; in the short and rounded form of the body; in the length of the scutellum, which is at least one-third of that of the elytra, and of that of the sternal point, the extremity of which reaches to the origin of the two anterior legs or extends beyond it. The mandibles are almost triangular, and their extremity is pointed and emarginate. The maxillæ are furnished with several teeth. The mentum forms an elongated square slightly narrowed near the superior extremity; its superior margin is destitute of cilia. One of the crotchets of the tarsi, at least of the four anterior ones, is bifid, the other entire(3).

Chasmodia, Mac Leay.

The Chasmodiæ are similar to the Macraspides in the general form of their body, the proportions of the scutellum and of the sternal point; but the extremity of the narrower mandibles is obtuse and entire; the maxillæ have only two teeth and a pencil of hairs, and the mentum is an elongated ovoid narrowed near the superior extremity, and its margin ciliated. All the tarsial crotchets are entire(1).

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(1) *Melolontha chrysochlora*, Lat.; Voy. de MM. Humb. and Bonpl., II, xv, 1, fem.; 2, male;—*Scarabæus macropus*, Shaw, Nat. Miscel., CCCLXXX, iv.

(2) See Catal. de la Coll., &c., Dej.; Horæ Entom., I, Mac L. and Encyc. Méthod., article *Rutèle*. The characters of the genera *Pelidnota* and *Oplognathus* do not seem to me sufficiently determined.

(3) See Catal., &c., Dej.; Horæ Entom., 1; Ency. Méthod., art. *Rutèle*.

There, an axillary piece—the same observed in that place in Cetonia, or the *epimera* of M. Audouin—fills the space comprised between the posterior angles of the thorax and the exterior angles of the base of the elytra.

OMETIS, Lat.(2)

The genus *Melolontha* of Fabricius will form our fourth and fifth sections.

The fourth, that of the PHYLLOPHAGI, is composed of Scarabæides that closely approach those of the two last subgenera; but the mandibles are covered above by the epistoma, and concealed beneath by the maxillæ; their outer side is alone exposed, without however overlapping; their outer side presents none of the sinuses or dentations observed there in Rutela and other analogous subgenera. The anterior edge of the labrum is exposed; it is sometimes in the form of a reversed and wide triangle, and most frequently transversely laminiform, and emarginated in the middle. The number of the antennal joints is not constant and varies from eight to ten; the same remark applies to those of the club, and in several, with respect to this, the two sexes differ greatly. The ligula is entirely covered by the mentum, or incorporated with its anterior face, and the elytra are completely joined along the whole of the suture, characters which distinguish these Insects from those of the fifth section.

The family of the Anoplognathides of M. Mac Leay, and some other subgenera closely allied to some of those in the preceding section, will compose our first division. The epistoma is thickened anteriorly, and either alone or with the labrum forms a vertical facet in the figure of a reversed triangle, the point of which rests on the mentum. The latter is sometimes almost ovoid, densely pilose, with the extremity either rounded or truncated and unemarginate; sometimes it forms a transverse square, with the middle of the superior margin prolonged into a tooth, simple or emarginate. The maxillæ of some are terminated by a coriaceous or membranous lobe that is densely pilose, edentate, or with but very small teeth, situated near the middle of the inner side; those of others are entirely corneous, resemble mandibles, and are either truncated, or obtuse and entire at the end, or terminated by two or three teeth.

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(1) See *Rutela*, Encyc. Méthod., and Hor. Entom.

(2) *Rutela cetonioides*, Encyc. Méthod.;—*Rutela cerata*, Germ.;—*Anisoplia histrio?* Dej., but with antennæ of nine joints.

This subgenus seems to connect these and the preceding Insects with the Cetoniæ.

Those, in which the mentum is almost ovoid and very hairy, and whose maxillæ terminate in a similarly pilose, triangular lobe, without teeth, or with but very small ones situated near the middle of its inner margin, form two subgenera(1).

Pachypus, Dej.—*Geotrupes*, *Melolontha*, Fab.

The antennæ of the males are composed of but eight joints, of which the five last form the club. The mandibles are in the form of very thin, triangular, elongated leaflets, and are entirely concealed, as is also the labrum. The terminal lobe of the maxillæ is very small, scarcely distinct, and without teeth. The mentum is extremely prominent, projects forwards, and is rounded on the summit. The terminal joint of the palpi is the longest of all, and nearly cylindrical.

The body is thick, the epistoma semicircular, concave above, and distinguished posteriorly from the vertex by a transverse carina. The thorax of the males is excavated and armed anteriorly with a horn; the four posterior tibiæ are strong, deeply incised transversely, with their extremity widened and crowned with a range of little spines; the spurs are large. The tarsi are long, slender, pilose, and terminated by two small equal and simple hooks.

With the exception of the antennæ and the form of the epistoma, this subgenus approximates much nearer to Oryctes than to Melolontha(2).

Amblyteres, Mac Leay.

The antennæ consist of ten joints, the three last forming the club. The labrum is exposed and lobate. The mandibles are strong and scaly. The maxillary lobe is of a moderate size, and its inner side armed with corneous teeth. The middle of the superior extremity of the mentum is slightly prolonged and truncated, the angles rounded and bearing the palpi; their last joint is ovoid, the same of the maxillæ is much elongated and very cylindrical. The scutellum is large(3).

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(1) The sternum presents no projection whatever.

(2) *Geotrupes excavatus*, Fab., the male; *Melolontha cornuta*, Oliv., Col., I, 5, vii, 74, a, b, the male; *Scarab. candidæ*, Petag., Insect. Calab., I, 6, a, b, the male: a black variety also, observed in Corsica by M. Peyrandeau, and subsequently in Sicily by M. Lefèvre;—*M. atriplius*, Fab., a female of another species.

(3) Mac Leay, Hor. Entom., I, p. 142. This gentleman says nothing about the crotchets of the tarsi, nor sexual differences. From the description of the species

In the other subgenera of the same division, the mentum forms a transverse square, the middle of the superior margin projecting in the manner of a tooth, entire or emarginated. The maxillæ are entirely corneous and resemble mandibles terminated by a stout, inclined, elongated tooth, either entire and very obtuse at the end, or divided there into two or three points. The mandibles are always scaly and robust. The labrum is exposed.

Some, peculiar to Australia, have a sternal point; their tarsial crotchets are entire and unequal. Such is the

ANOPLOGNATHUS, REPSIMUS, Leach.

The antennæ are composed of ten joints, and the extremity of the maxillæ is truncated, or obtuse and entire. These Insects are generally large and ornamented with brilliant colours(1).

The others, proper to the hot climates of both continents, are destitute of the sternal projection; the crotchets of the tarsi, or one of them, are bifid; their maxillæ frequently terminate by two or three teeth.

Sometimes the antennæ consist of ten joints, and the superior extremity of the jaws is entire or at most emarginate or bidentate. In

LEUCOTHYREUS, Mac Leay.

One of the tarsial crotchets is entire and the other bifid.

The tarsi, at least the anterior ones, are furnished with a brush beneath; the latter are dilated in the males. The under part of their head is more densely pilose than in the females(2). In

APOGONIA, Kirb. Mac Leay.

All the crotchets of the tarsi are bifid(3).

Sometimes the antennæ consist of but nine joints, and the extremity of the maxillæ presents three teeth. In

GENIATES, Kirb.

The extremity of the mandibles is emarginated. Under the mentum of the males we observe a sort of circular brush formed of compact hairs, plane or incised like a whisk (en manière de vergette).

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which is the type of the genus, the thorax must be destitute of horns, and the anterior tibiæ are tridentate on the outer side; but two teeth are found in the same of Pachypus.

(1) See Hor. Entom., I, 143, and Lin. Trans., XII, p. 401, 405.

(2) Hor. Entom., I, p. 145;—*Melolontha sulcicollis*, Germ., Insect. Spec. Nov., p. 124.

(3) Kirb., Lin. Trans., XII, p. 401;—*A. gemellata*, ejusd., Ib. XXI, 9.

The four first joints of their anterior tarsi are dilated and furnished underneath with a brush. One of the crotchets of all the tarsi is entire and the other bifid. The anterior of the two first is accompanied at its base by a corneous lamina, emarginated inferiorly and rounded at the end, forming a sort of spur(1).

A second division of the Xylophili, which will comprise the Melolonthidæ of Mac Leay, presents the following characters: the labrum is in the form of a transversal leaflet, most commonly strongly emarginated underneath in its middle, so that viewed from before, it has almost the figure of a reversed and semitruncated heart. The mentum is as long as it is broad, or longer, somewhat narrowed before the summit, and either square or almost cordiform; its superior margin is straight, or more or less emarginated or concave in the middle, but without any dentiform dilatation. The maxillæ are usually scaly and armed with several—commonly five or six—teeth.

This division may be separated into two sections, one of which will embrace the genus *Melolontha* of Fabricius, as restricted by Illiger and myself, and the other that of *Hoplia*, Lat. The first of these subdivisions may retain the name of *Melolonthidæ*, and the other receive that of *Hoplidæ*.

The first may be described as follows. The number of perfect leaflets of the club exceeding three in several. The body extremely thick. Mandibles stout, wholly or mostly corneous, presenting at most a membranous and pilose appendage, situated in a cavity or emargination of the inner side; the superior extremity strongly truncated with two or three teeth or angular projections. All the tarsi terminated by two crotchets; the first joint of the two anterior ones not prolonged inferiorly into a hooked appendage. Labrum usually apparent. Maxillary teeth robust.

In those species of the Melolonthidæ, Fab., which compose the subgenus

MELOLONTHA, Fab.,

Or Melolontha properly so called, the antennæ consist of ten joints, of which in the males, the last six or seven, and in the females, the last six or four, form the club. The labrum is thick and strongly emarginated beneath. All the hooks of the tarsi are equal, terminate in an entire point, and are simply unidentate at base. The posterior extremity of the abdomen most commonly ends in a point or stylet, at least in the males.

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(1) Kirby, Lin. Trans., XII, p. 401;—*Geniates barbatus*, Ib., XXXI, 8. The Melolonthæ *obscura*, *lanata*, Fab., the species called *nigrifrons* by M. Stevens, and described in the Synon. Insect. of Schœnherr, I, 3, App. 115, and probably other species, seem to form a separate subgenus allied to that of Geniates, but with undilated tarsi.

Of those species in which the antennal club is composed of seven leaflets in the males, and of six in the females we will mention

M. fullo; *Scarabæus fullo*, L.; Oliv., Col. I, 5, iii, 28. About an inch and a half long; brown or blackish; three lines on the thorax, two white ovoid spots on the scutellum, and several other irregular ones on the elytra. The antennal club of the male is very large. Found near the sea coast on the Downs.

M. vulgaris; *S. melolontha*, L.; Oliv., Ib., I, 1, a—d(1). Black; hairy; the antennæ, anterior margin of the epistoma, elytra and greater part of the feet reddish-bay; thorax somewhat dilated and marked with an impression near the middle of its lateral edges, sometimes black, and sometimes red; four elevated lines on the elytra, whose outer margin is the colour of the ground; triangular white spots on the sides of the abdomen; the anal stylet tapering insensibly to a point.

M. hippocastani, Fab.; Oliv., Ib., I, 3, a, b, c. This Insect, formerly confounded with the *vulgaris*, is rather smaller, shorter and more convex; the elytra are margined with black, and the anal stylet is proportionably shorter and contracted before the extremity which thus appears broad and obtuse.

The alimentary canal of the Melolontha vulgaris, according to M. Leon Dufour—Ann. des Sc. Nat., III, p. 234—is not so long as that of Copris, but its parietes are shorter. The chylific ventricle is wholly destitute of papillæ, and exhibits beautiful fringes on its surface, which are formed by hepatic vessels. The small intestine is followed by a species of colour furnished with internal valvulæ under the form of small, triangular, and imbricated pouches, arranged in six longitudinal series, separated by as many muscular cords. M. Dufour has frequently found these pouches filled with a green, vegetable pulp. The structure of the biliary vessels is extremely delicate; they form multiplex flexures, and several of them, right and left, are furnished with little fringe-like filaments. The copulating armature of the male is extremely thick, very hard, terminated by two stout hooks, and presents an articulation near its posterior third, which facilitates its motion. Each testis is an agglomeration of six orbicular, and as if umbilicated, spermatic capsules, each one furnished with a separate, tubular duct, resembling the kind of leaf designated by botanists as *peltate* or *umbilicated.*

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(1) While this work was in press, that of M. Straus on the anatomy of the *M. vulgaris* was presented to the Acad. Royale des Sciences, at whose expense it was published. We sincerely regret that we had not time to profit by this excellent work. M. Leon Dufour had already made us acquainted with every thing relative to the system of digestion and the organs of generation. M. Chabrier had also described and figured with great exactness the muscles of the wings and the thorax. M. Straus has completely supplied all other deficiencies.

These Insects occasionally appear in such numbers that they speedily destroy the leaves of considerable tracts of forest. The larvæ are not less injurious in our gardens. It is commonly called the *Ver blanc.*

> *M. villosa*, Oliv., Ib. I, 4. Distinguished from the preceding species by the club of its antennæ, which consists of five leaflets in the males, and four in the females; body brown, more or less dark, sometimes reddish above; three grey lines on the thorax formed by down; scutellum and under part of the body furnished with a similar down, which forms spots on the sides of the abdomen(1).

Now the antennal club in both sexes never presents more than three leaflets. The

RHISOTROGUS, Lat.

Closely resembles Melolontha in the general form of the body, that of the labrum and tarsi; but the antennæ, which consist of nine or ten joints, have but three leaflets in the club(2). In

CERASPIS, Lepel. and Serv.

There are two small longitudinal incisures in the middle of the posterior margin of the thorax, the space comprised between them forming a tooth, the extremity of which is received into a corresponding emargination in the scutellum. The antennæ are composed of ten joints. All the hooks of the tarsi, with the exception of the anterior, are unequal; the strongest of the intermediaries is entire in the male; the others, and the six in the females, are bifid. The body is covered with little scales.

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(1) Add *M. hololeuca*, Fisch., Entom. Russ. Imp., II, xxviii, 3;—*M. Ankeleri*, Ejusd., 4;—*M. pilosa*, Fab.; Fisch., Ib., 9;—*M. occidentalis*, Fab., &c. See Schœnh., Synon. Insect. I, 3, p. 162.

(2) As it is not always an easy matter to ascertain exactly the number of joints that immediately precede the club of the antennæ, I unite the genus I had named *Amphimalla*, where those organs consist of but nine joints, to Rhisotrogus. The *M. solstitialis, pini, serrata, fervida, atra, æquinoctialis, ruficornis*, &c., of Fabricius. The third joint appears to be decomposed.

But few species are known, and all of them are from Brazil(1). The

ARRODES, Leach. Mac L.

Have ten joints in the antennæ, a corneous sternum, and all the hooks of the tarsi equal in the individuals presumed to be females—Lepel. and Serv.—and unequal in the males; the thickest of the two anterior ones of the latter is bifid, and all the others are entire.

The colours of these Insects are very brilliant(2).

In all the preceding Phyllophagi, with some few exceptions, we have found the antennæ to consist of ten joints. In all the following ones of the same division, or that of the Melolonthidæ, we shall find but nine.

Here all the hooks of the tarsi are equal; one of the two anterior ones, at most, is sometimes larger.

DASYUS, Lepel. and Serv.

Hooks of the anterior tarsi, at least in the males, bifid; and the others entire(3).

SERICA, Mac L.—*Omalopia*, Dej.

All the hooks of the tarsi bifid; body ovoid, arched, silky, and frequently with changeable reflections; thorax much wider than long(4).

DIPHUCEPHALA, Dej.

Here also all the hooks of the tarsi are bifid; but the body is narrow and elongated, and the thorax almost square. The first joints of the four (male) or two (female) anterior tarsi are short, and provided with brushes underneath; the same joints are dilated, or wider in the four first tarsi of the males. The epistoma is strongly and angularly emarginated.

These Insects are peculiar to New Holland(5).

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(1) The *Ceraspis pruinosa*, Lepel. and Serv., Encyc. Méthod., is the *M. bivulnerata* of Germar. The *M. variegata* of the latter also appears to me to be a true *Ceraspis*.

(2) Hor. Entom., I, p. 158.

(3) Encyc. Méthod., article *Scarabéïdes*.

(4) Mac Leay, Hor. Entom., I, 146. The *M. brunnea, variabilis, ruricola*, &c., of Fabricius. M. Mac Leay says that the antennæ are composed of ten joints, but I can find but nine. The length and form of the tarsial segments vary.

(5) *Melolontha colaspidoides*, Schœnh., Synon. Insect., I, 3, App., p. 101. See the Catalogue, &c., of Dej., p. 58.

Macrodactylus, Lat.

Similar to Diphucephala in the hooks of the tarsi and the elongation of the body; but here the thorax is longer, almost hexagonal, and all the joints of the tarsi are alike in both sexes, elongated and simply pilose.

They are peculiar to the western continent(1).

There, the hooks of the intermediate tarsi are alone unequal.

Plectris, Lepel. and Serv.

The largest of these hooks and the two of the other tarsi bifid; first joint of the posterior tarsi very long(2).

In the others, all the hooks of the tarsi are unequal; those of the two posterior ones, at least, are always entire; one at least of the two or four anterior tarsi of the males, and sometimes of the females, is bifid.

Popilia, Leach.

The sternum advancing between the legs in a compressed and truncated, or very obtuse lamina(3).

Euchlora, Mac L.—*Anomala*, Meg. Dej.

No sternal projection; one of the hooks of the four anterior tarsi bifid in the males; body arched; epistoma short and transversal(4).

Anisoplia, Meg. Dej.

No sternal elongation; but one of the hooks of the four anterior tarsi is bifid in the two sexes; the back is depressed, and the epistoma usually narrowed anteriorly, and raised at its extremity(5).

Lepisia, Lepel. and Serv.

No sternal spine, but distinguished from the preceding by the four anterior tarsi, the hooks of which are bifid(6).

The Hoplidæ or the Phyllophagi, of our third and last division, have small depressed mandibles, as if divided longitudinally into two parts, the inner of which is membranous, and the other corneous; there are no sensible dentations at their superior extremity. The labrum is concealed, or but little apparent(1). The maxillæ have frequently but small dentations. The body is short, depressed, and wide; the elytra are narrowed posteriorly on the outer side. The two last tarsi usually have but one hook; in those where they all have two—*Dicrania*—the first joint of the anterior tarsi is prolonged inferiorly, and presents on the inner side a stout, hooked tooth.

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(1) *M. subspinosa*, Fab., and several undescribed species.

(2) Encyc. Méthod., article *Scarabéïdes*.

(3) *Trichius 2-punctatus*, Fab.

(4) The *M. viridis*, *bicolor*, *errans*, *marginata*, *cyanocephala*, *vitis*, *Julii*, *Frischii*, *holosericea*, *aurata*, &c., of Fabricius. See Hor. Entom., I, p. 147. The genus *Mimela*, Kirby, appears to me to approximate closely to Euchlora; not having seen a specimen of the former, I can say no more.

(5) The *M. horticola*, *floricola*, *auricola*, *fruticola*, *agricola*, *lineata*, &c., Fab.

(6) Encyc. Méthod., article *Scarabéïdes*.

M. Leon Dufour remarks that the digestive canal of the Hopliæ is much shorter than that of the Cetoniæ. The chylific ventricle is smooth and flexuous. The small intestine is shorter than in Melolontha, and frequently presents an ovoid inflation at its origin. It is followed by an elongated colon, destitute of valvular anfractuosities. The rectum is separated from it by a well marked collar. The organs of generation hardly differ from those of Melolontha.

DICRANIA, Lepel. and Serv.

Two equal and bifid hooks to all the tarsi, the first joint of the two anterior ones prolonged inferiorly into a hooked tooth; the body very smooth and without scales; the scutellum tolerably large; two stout spines at the extremity of the four posterior tibiæ; the inferior extremity of the two last tibiæ dilated. These Insects inhabit Brazil(2).

HOPLIA, Illig.

A single hook to the two posterior tarsi; the two of the others unequal and bifid; extremity of the four last tibiæ crowned with small spines, none of which is perceptibly longer than another. The body is nearly square or almost semicircular, and the thighs of the two posterior legs are moderately inflated, their tibiæ long, straight, and without a hooked tooth at the extremity.

> *H. formosa*, Illig.; *Melolontha farinosa*, Fab.; Oliv., Col., I, 5, ii, 14, a, c. Nine joints in the antennæ; the body entirely covered with brilliant silvery scales, the upper ones reflecting a violet blue tint; the lower ones somewhat greenish or gilt.—This most beautiful of all the known species is common in the south of France along the banks of brooks and rivers.

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(1) In the latter of the preceding subgenera this part also, viewed from before, merely presents a linear, transverse edge, either entire or slightly emarginated in the middle.

(2) Encyc. Méthod., article *Scarabæides*.

The antennæ of some others are composed of ten joints(1). The

Monochèles, Illig.,

Only differs from Hoplia in the epistoma, which forms a triangle truncated at the anterior extremity, and in the two posterior legs, of which the thighs are very large and the tibiæ short, with a stout hooked tooth at the extremity(2).

Certain Scarabæides, closely allied to the last of the preceding section, and which were at first united with them in the genus Melolontha, but in which the paraglossæ, or two divisions of the ligula, project beyond the superior extremity of the mentum, and where the elytra gape or are slightly remote on the side next the suture, at their posterior extremity, which is either narrowed into a point or rounded, form a fifth section, that of the Anthobii.

The antennæ are composed of nine or ten joints, the three last of which alone form the club in both sexes. The lobe terminating the maxillæ is frequently almost membranous, silky, penicilliform, coriaceous, and dentated along the inner edge in others. The labrum and mandibles are more or less solid in proportion as they are more or less exposed.

The Anthobii live on flowers or leaves.

In some, the mandibles and labrum are salient, and all the tarsi have two entire and equal hooks.

The antennæ consist of ten joints; the maxillary palpi are rather larger near the end, the last joint short or but slightly elongated and truncated; the mandibles are corneous.

Some of these Insects inhabit the north of Africa and other countries situated on the Mediterranean; most of the others are found in the higher portions of western Asia.

In these, the first joint of the antennal club is concave and encases the others. In

Glaphyrus, Lat.

The inner edge of the mandibles is dentated, and the outer forms an acute angle; the antennal club is almost ovoid; the teguments are firm and the posterior thighs inflated. The maxillary palpi are much longer than the others, with the last joint longer than the preceding one. The inner lobe of the maxillæ is dentiform, the outer or terminal one coriaceous. The thorax is oblong, and the posterior legs large(1).

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(1) See Latr., Gener. Crust. et Insect., II, p. 115.

(2) Encyc. Méthod., art. *Scarabéïdes*.

AMPHICOMA, Lat.

Outer side of the mandibles rounded and arcuated, the inner not dentated; antennal club globular; abdomen soft, and all the legs of the ordinary size.

The epistoma is strongly bordered. The anterior tibiæ have three teeth exteriorly. The four first joints of the tarsi are strongly ciliated in the males.

In this and the following subgenus, the maxillæ terminate in a membranous, narrow, elongated, thong-like lobe. Their palpi are hardly longer than the others, and the length of their last joint is scarcely greater than that of the preceding one(2).

In those, such as

ANTHIPNA, Escholtz,

The antennal club is formed of free and oval leaflets.

The epistoma is not bordered before; the median portion of the head forms with it a plate of a long square figure, bordered laterally and posteriorly. The outer side of the anterior tibiæ has two teeth. The four first joints of the tarsi are dilated and dentiform in the males. These Insects otherwise resemble the Amphicomæ(3).

In the others, the labrum and mandibles are covered or non-salient, and some at least of their tarsial hooks are bifid. The mentum is elongated and pilose.

Sometimes there are two hooks to all the tarsi. The antennæ never have more than nine joints. The epistoma is usually transversal. The palpi are but slightly elongated, and their last joint is oval.

Here, the posterior legs differ but little from the others.

CHASMOPTERUS, Dej.—*Melolontha*, Illig.

All the hooks of the tarsi bifid; terminal lobe of the maxillæ narrow, elongated, with two remote teeth on the inner margin; the body almost oval, thorax rounded and the elytra of equal width throughout(4).

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(1) Lat., Gen. Crust. et Insect., II, p. 117.

(2) See Lat., Gener. Crust. et Insect., II, p. 118; genus *Amphicoma*, first division.

(3) *Amphicoma abdominalis*, Lat., Gener. Crust. et Insect., II, p. 119; *M. alpina*, Oliv., Col., I, 5, x, 112.

(4) See Catalogue, &c., Dej., p. 60.

CHASME, Lepel. and Serv.

The Chasmes only seem to differ from the preceding Insects in the hooks of the two posterior tarsi, the largest of which is alone bifid(1).

There, the posterior thighs, at least in the males, are very large and dentated, their tibiæ thick and terminated by a strong hook.

DICHELES, Lepel. and Serv.—*Melolontha*, Fab. Oliv.

The body is short, but slightly pilose, and the elytra are narrowed towards the extremity, forming an elongated triangle. The posterior legs are partly contractile. All the hooks of the tarsi are equal and bifid. The terminal lobe of the maxillæ is dentated along its inner margin, as in Hoplia, to which this subgenus closely approaches(2).

Sometimes the two posterior tarsi have but a single hook—those of the others are unequal and bifid.

Some, like the preceding, have but nine joints in the antennæ.

LEPITRIX, Lepel. and Serv.—*Trichius*, *Melolontha*, Fab.

The body short; thorax narrower than the abdomen, nearly square, and slightly narrowed posteriorly; abdomen broad and posterior legs large; last joint of the maxillary palpi much longer than in the preceding subgenera; terminal lobe of the maxillæ very small and in the form of a short triangle(3).

The others have ten joints in their antennæ.

The body is short and densely pilose; the epistoma forms an elongated triangle, truncated or very obtuse at the end; the salient palpi are terminated by a long and cylindrical joint; the maxillary lobe is long, narrow, salient at the extremity and destitute of teeth; the abdomen large, and the posterior legs long.

PACHYCNEMUS, Lepel. and Serv.—*Melolontha*, *Trichius*, Fab.

The elytra narrowed near their extremity, thighs and tibiæ of the two posterior legs inflated, the latter almost clavate, with one of the two extreme spurs much stouter than the other.

ANISONYX, Lat.—*Melolontha*, Fab.

The elytra forming a long square, rounded posteriorly; posterior tibiæ almost cylindrical, or in the form of an elongated cone, and the spurs at their extremity of an equal size.

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(1) Encyc. Méthod., article *Scarabéïdes*.

(2) Ibid., idem.

(3) Ibid., idem.

The sixth and last section of the Scarabæides, that of the MELITOPHILI, is composed of Insects in which the body is depressed, most commonly oval, brilliant, and without horns, and the thorax is trapeziform, or nearly orbicular; an axillary part, in the greater number, occupies the space comprised between the posterior angles and the exterior of the base of the elytra. The anus is exposed. The sternum is frequently extended into a point or projecting horn. The hooks of the tarsi are equal and simple. The antennæ consist of ten joints, the three last of which form a club, always foliaceous. The labrum and mandibles are concealed, laminiform, flattened, and membranous, or nearly so. The maxillæ terminate in a silky, penicilliform lobe without horny teeth. The mentum is commonly ovoid, truncated superiorly, or almost square, and the middle of the superior margin more or less concave or emarginate. The ligula is not salient.

From the anatomical observations of M. Leon Dufour on several of these Insects, we may conclude, that of all the Scarabæides their alimentary canal is the shortest. The external tunic of the chylific ventricle is usually covered with extremely small, superficial papillæ, in the form of salient points. The inflation which terminates the small intestine is not cavernous, as in the Melolonthæ. The copulating armature of the males also differs from that of the latter. Each testis consists of ten or twelve spermatic capsules. Their peculiar ducts do not unite in one common point to form the vas deferens, but communicate with each other in various ways. The number of vesiculæ seminales is from one to three pairs. The ejaculating canal is extremely tortuous, and becomes greatly inflated before it penetrates into the organ of copulation(1).

The larvæ live in rotten wood. The perfect Insect is found on flowers, and frequently on trunks of trees, that give out a fluid which they suck.

This section is susceptible of being separated into three principal divisions, the first of which corresponds to the genus *Trichius*, Fab.; the second to that of *Goliath*, Lam.; and the third to *Cetonia*, Fab., but reduced and simplified by the abstraction of the second genus, as well as of Rutela and other analogous sections.

The Melitophili of the two first divisions have no well marked sternal projection; the lateral portion of the mesosternum, which we have designated by the term axillary—epimera of Audouin—is not generally visible above, or merely occupies a portion of the space comprised between the posterior angles of the thorax and the exterior base of the elytra. The thorax does not widen from before posteriorly, as in the Cetoniæ. The outer side of the elytra is not abruptly narrowed or unisinuate a little below the humeral angles, as in the latter Insects. A more rigorous character, however, is, that here the labial palpi are inserted in lateral fossulæ of the anterior face of the mentum, so that they are entirely exposed, and that the sides of this mentum jut beyond them, even at their origin, and protect them behind. In the two first divisions these palpi are inserted under the lateral margin of the mentum, or even in the margin, so that when viewed from before the first joints are not perceptible.

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(1) See Ann. des Sc. Nat., III, p. 235, and IV, p. 178.

In the first—*Trichides*—the mentum is either isometrical, or longer than wide, and leaves the maxillæ exposed. It comprises the

TRICHIUS, Fab.(1)

T. nobilis; Scarabæus nobilis, L.; Oliv., Col., I, 6, iii, 10. About an inch long; golden-green above; cupreous with yellowish-grey hairs beneath. On umbelliferous plants.

T. fasciatus; Scarabæus fasciatus, L.; Oliv., Ib., ix, 84. Rather smaller; black, with scattered yellow hairs; elytra yellow with three transverse, black bands, interrupted at the suture. Very common in spring on flowers.

T. eremita; Scarab. eremita, L.; Oliv., Ib., iii, 17. Large, and of a brown-black; margin of the head turned up; three sulci on the thorax.—On the trunk of old trees, in the interior of which resides the larva.

The female of the *T. hemipterus*—*Scarabæus hemipterus*, L., Oliv., Ib., IX, 83, xi, 103—and those of some other species of North America are remarkable for the horny ovipositor at the posterior extremity of their abdomen, by which they effect a lodgement for their ova.

These species are generally found on the ground, where they move very slowly. The last joint of their maxillary palpi is proportionably shorter and thicker than that of other Trichii; the length of the first of the posterior tarsi also appears to me to be considerably greater than the following one, while in the other Trichii it is not so(2).

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(1) Messrs Lepeletier and Serville, Encyc. Méthod., have established several new divisions, some of which, it appears to us, should form separate subgenera.

(2) See Schœnherr, Synon. Insect., I, iii, p. 99.

The second division, *Goliathides*, is distinguished from the preceding by the mentum, which is much longer, wider, and covers the maxillæ.

Here the mentum is concave in the middle, and in the form of a widened heart or of a transversal square. The anterior extremity of the epistoma is neither dentate nor cornute. The thorax has the form of a heart, truncated at both ends and abruptly narrowed behind, or that of a transverse square, rounded laterally.

The first joint of the antennæ is very large, triangular, or in the form of a reversed cone. The palpi are short: the last joint of the maxillaries is elongated. The outer side of the two anterior tibiæ presents two teeth.

PLATYGENIA, Mac L.

The body much flattened; thorax almost cordiform and widely truncated at both ends; maxillæ terminated by a pencil of hairs, the internal lobe triangular and emarginate at the end; last joint of the palpi ovoido-cylindrical; mentum almost square, emarginated in the middle of its superior edge, and slightly on the sides; inner side of the posterior tibiæ densely pilose(1). In

CREMASTOCHEILUS, Knoch,

The thorax nearly forms a transversal square; the maxillæ are terminated by a strong hooked or falciform tooth, with setæ or little spines in lieu of an inner lobe; the last joint of the palpi is very long and cylindrical; and the mentum in the form of a widened heart, or of a reversed triangle, with its superior angles rounded and without any sensible emargination(2).

There, the mentum is in the form of a much widened heart, without a discoidal cavity, and its superior margin emarginate or sinuous. The anterior extremity of the epistoma, in the males, is divided into two lobes, in the form of truncated or obtuse horns. The thorax is nearly orbicular.

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(1) Hor. Entom., I, p. 151; *Trichius barbatus*, Schœnherr, Synon. Insect., I, iii, App. 38.

(2) Lat., Gener. Crust. et Insect., p. 121. M. Dupont, naturalist to the Duke of Orleans, whose collection of Coleopterous Insects, next to that of Count Dejean, is the most extensive in Paris, has received from Lamana—French Guiana—an Insect presenting all the essential characters of a Cremastocheilus, but in which the epimera or axillary pieces are more apparent when the animal is viewed from above. The anterior tibiæ are arcuated, and have a strong dentiform projection on the inner side. All the tarsi are short, thick, cylindrical, and terminated by two very long hooks. The anterior extremity of the epistoma is turned up in the manner of an almost square blade. The posterior extremity of the head presents an elevation divided into two teeth or tubercles. This Insect is about an inch long, black, with a red spot on each elytron.

The *Cetonia elongata*, of Olivier, appears to be a Cremastocheilus.

GOLIATH, Lam. Kirb.—*Cetonia*, Fab. Oliv.

A subgenus which, according to M. de Lamarck, is composed of large and beautiful species, some of which inhabit Africa and the East Indies, and the others, tropical America. Messrs Lepeletier and Serville—Encyc. Méthod., article Scarabéides—have separated the latter from it under the generic appellation of INCA. The epimera is not prominent. The inner sides of the thighs of the two anterior legs are furnished at base with a tooth and an emargination. The middle of the superior margin of the mentum is strongly emarginated; this part in the true Goliaths presents four lobes or teeth, two superior and the two others lateral. The labial palpi are inserted on its edges in the emarginations of these latter lobes. All the known species are large; but M. Verreaux, Jun., the nephew and fellow traveller of the late Delalande, and who has returned to the Cape of Good Hope, has lately sent us a species which is not larger than the *C. gagates*, which it also resembles in its colours, and which presents all the characters of a Goliath. The *C. geotrupina* of M. Schœnherr is perhaps also congeneric. The thorax in Goliath is less round and pointed than in Inca. The anterior thighs are not dentated, and there is no emargination in the inner side of their tibiæ(1).

In the third division of the Melitophili, a section corresponding to the family of the *Cetoniidæ*, Mac Leay, the sternum is prolonged more or less into an obtuse point between the second pair of legs; the epimera or axillary piece is always apparent above, and occupies all the space that separates the posterior angles of the thorax from the base of the elytra; the thorax usually becomes widened posteriorly, and has the form of a triangle truncated anteriorly or at the point(2). The mentum is never transversal, and its superior

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(1) See Encyc. Méthod., art. *Scarabéides;* the Hist. des Anim. sans verteb., Lam.; the Observ. Entom., Weber, and Lin. Trans., XII; p. 407, where M. Kirby describes two species. There is an Insect in Java, that at a first glance appears to be a Goliath, and which Messrs Lepeletier and Serville have considered as such; but it has all the essential characters of a Cetonia; the thorax is merely rounded and narrowed posteriorly. The male has a bifurcated horn on the head.

(2) Almost orbicular in some, as in the *C. cruenta*, Fab.; *C. ventricosa*, Schœnherr, &c.

M. Chevrolat, possessor of a splendid collection of Coleoptera, among which are several from that of Olivier, has shown me a species found in Cuba by M. Poe edge is more or less emarginated in the middle. The terminal lobe of the maxillæ is silky or penicilliform. The body is almost ovoid, and depressed.

This division comprises the genus

CETONIA, Fab.,

With the exception of the species that belong to the preceding subgenus and to Rutela(1).

In some, the thorax is prolonged posteriorly in the form of an angle, so that the scutellum totally disappears. They form the genus *Gymnetis*, Mac Leay, Hor. Entom., I, p. 152. Several are found in America. Some inhabit Java, and the eastern parts of Asia, in which the thorax is similarly prolonged, but where the scutellum, although very small, is still visible(2); the mentum is also more deeply and angularly emarginated, and the last joint of the labial palpi is proportionally longer. The epistoma is more or less bifid. There are others in New Holland and the East Indies in which the epistoma is still bifid or armed with two horns in the males, but the body is proportionally narrower and more elongated, the abdomen considerably narrowed posteriorly, even almost triangular, and the antennal club considerably elongated—they compose the genus *Macronota* of Wiedemann. These sections however can only be considered as established, when the numerous species of the genus *Cetonia* of Fabricius have been particularly studied.

Those of Europe are provided with a scutellum of an ordinary size. Such are the

C. aurata; *Scarabæus auratus*, L.; Oliv., Col., I, 6, i, i. Nine lines in length; a brilliant golden-green above, cupreous-red beneath; white spots on the elytra. Common on flowers and frequently on those of the Rose and Elder.

C. fastuosa, Fab.; Panz., Faun. Insect. Germ., XLI, 16. Larger than the aurata; immaculate, uniform, golden-green; tarsi bluish. South of France.

C. stictica; *Scarab. sticticus*, L.; Panz., Ib., I, 4. Five lines in length; black, somewhat pilose, with white points; those on the venter arranged in two or three lines, according to the sex. Very common on Thistles(3).

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which has the air of a Trichius, but the axillary pieces and sternal prolongation of the Cetoniæ. Certain species of this last genus—*C. cornuta*, Fab.—have the thorax furnished with a small horn, and at the first glance resemble Scarabæi.

(1) Lat. Gener. Crust. et Insect.

(2) *C. chinensis*, Fab.;—*C. regia*, Fab.;—*C. palma*, and *imperialis*, Schœnherr.

(3) See the first division of the Cetoniæ of Olivier; Latr., Gener. Crust. et In-

In the second tribe of the Lamellicornes or the LUCANIDES, so called from the genus *Lucanus* of Linnæus, the antennal club is composed of leaflets or teeth arranged perpendicularly to its axis in the manner of a comb. These organs always consist of ten joints, the first of which is usually much the longest. The mandibles are always corneous, most commonly salient and larger, and even very different in the males. The maxillæ, in most of them, are terminated by a narrow, elongated and silky lobe; those of others are entirely corneous and dentated. The ligula in the greater number is formed of two small silky pencils projecting more or less beyond an almost semi-circular or square mentum. The anterior legs are most frequently elongated, and their tibiæ dentated along the whole of the outer side. The tarsi terminate by two equal and simple hooks with a little appendage terminated by two setæ between them. The elytra cover the whole of the abdomen above.

We will divide it into two sections, corresponding to the genera *Lucanus* and *Passalus* of Olivier.

In the first we find the antennæ strongly geniculate, glabrous or but slightly pilose; the labrum very small or confounded with the epistoma; maxillæ terminated by a membranous or coriaceous, very silky, penicilliform lobe without teeth, or at most with but one; and a ligula either entirely concealed or incorporated with the mentum, or divided into two narrow, elongated, silky lobes extending more or less beyond the mentum. The scutellum is situated between the elytra.

The first section will form the genus

LUCANUS.

We will make a first division with those in which the antennal club consists of but from three to four joints or leaflets.

We will begin with Insects, which, with the exception of their antennæ, are almost entirely similar to *Oryctes*, a subgenus of the

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sect., I, iii, p. 126; Schœnh., Synon., I, iii, p. 112, and Lin. Trans., XIV, with respect to the genera, *Genuchus*, *Schizorhina*, and *Gnathocera*, established at the expense of that of Cetonia.

preceding tribe. The mandibles are concealed, edentate, and alike in both sexes. The mentum is almost triangular, and completely conceals the ligula, as well as the base of the maxillæ. The body is thick and convex above, almost cylindrical and rounded exteriorly. The thorax is truncated and excavated before. The head of the males is furnished with a horn.

SINODENDRON, Fab.

Antennal club formed by the three last joints(1).

Those which have a thick, convex, ovoid body; mandibles forming a compressed and vertically projecting forceps in the males; a head much narrower than the thorax measured in its greatest width; and the tibiæ, at least the two anterior ones, broad and in the form of a reversed triangle, form two subgenera, viz.

ÆSALUS, Fab.

Where the mandibles, even in the males, are shorter than the head, and terminated posteriorly in the manner of a horn; the mentum conceals the maxillæ; the ligula is very small; the body short and arched; the head almost entirely received into the emargination of the thorax; the tibiæ are compressed and triangular, and the sternum simple or without any projection(2).

LAMPRIMA, Lat.

Where the body is more elongated; the mandibles much longer than the head, in the males laminiform, vertical, angular, much dentated and pilose on the inner side; the maxillare exposed down to the base; the ligula very distinct; the labrum elongated; the two anterior tibiæ widened, and offering in the males a palette (spur) in the form of a reversed triangle, and a sternal point(3).

Two other subgenera established by M. Mac Leay, Jun. approximate to Lamprima in their prolonged mesosternum, projecting, however, less than in the preceding ones, in the head, which is much narrower than the thorax, and finally in their mandibles, the inner side of which is furnished with down; but their body is flattened or but slightly elevated, particularly in the females. The labrum is concealed, the anterior tibiæ are narrow and without a palette. The palpi and lobes of the ligula are more elongated.

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(1) *Scarabæus cylindricus*, L.; Oliv., Col., I, 3, ix, 88. It is the only species known, the remaining Sinodendrons of Fabricius belonging to other genera.

(2) *Æsalus scarabæoides*, Fab.; Panz., Faun. Insect. Germ., XXVI, 15, 16.

(3) Lat. Gener. Crust. et Insect., II, p. 132; *Lethrus æneus*, Fab.; Schreib., Lin. Trans., VI, 1. See also Mac Leay, Hor. Entom., I, 99.

###Ryssonotus, Mac L.

The mandibles of the males, as in Lamprima, forming a vertically compressed, angular and dentated forcèps(1).

Pholidotus, Mac L.—*Chalcimon*, Dalm.—*Lamprima*, Schœnh.

Where the mandibles in the same sex are very long, narrow, arcuated, terminated in a hook curved downwards and securiform on the inner side.

The club of the antennæ formed by the three last joints is less pectinated than in the others, and almost perfoliaceous. The mentum covers the maxillæ(2).

In the following subgenera the mesosternum does not project. The head is as wide as the thorax or (in various males) wider. The mandibles are glabrous or at least without a thick down on the inner side. The body is always flattened.

Here, the eyes are not cut transversely by the margin of the head; the maxillæ are terminated by a very slender penicilliform lobe without corneous teeth.

Lucanus, Lin.

The digestive canal of the true Lucani is much less elongated than that of the Scarabæides, but the esophagus is much longer. The male organs of generation also differ greatly from those of the preceding Insects, the testes being formed by the circumvolutions of a spermatic vessel, and not by an agglomeration of seminal capsules. The adipose tissue, which almost disappears in the Scarabæides, is here abundant and disposed in clusters, which converge to the median line.

The larva of the *L. cervus*, which inhabits the interior of the Oak for several years previous to its final metamorphosis, is considered as the *Cossus* of the Romans, or that verminiform animal which they regarded as a delicious article of food.

L. cervus, L.; Oliv., Col., I, i, 1; Rœs., Insect. II; Scarab., I, iv, v. The male two inches in length, and larger than the female; black, with brown elytra; head wider than the body; mandibles very large, arcuated, with three very stout teeth; two of which are at the end and diverge, the other is in the inner side, all furnished with small ones. The females, called *Does*, have a narrower head and much smaller mandibles. It flies at night in the heat of summer. Its size and mandibles vary. It is to one of these varieties that we must refer the *Lucane chèvre* of Olivier, or the *L. capreolus* of Fabricius. The Lucanus, so called by Linnæus, is a species from North America, and very distinct from the preceding.

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(1) *Lucanus nebulosus*, Kirb., Lin. Trans., XII, xxi, 12; Mac L., Hor. Entom., I, p. 98.

(2) *Lamprima Humboldii*, Schœnh.; *Chalcimon Humboldii*, Dalm., Ephem. Entom., I, p. 3; *Pholidotus lepidosus*, Mac L., Hor. Entom., I, p. 97, the male; *Cassignetus geotrupoides*, ejusd., the female.

L. caraboides, L.; Oliv., Col., Ib., II, 2. Five lines in length; greenish brown; mandibles crescent-shaped, and not surpassing in length that of the head, even in the males(1).

There, the eyes are entirely and transversely divided by the edges of the head. The maxillæ are terminated by a shorter and narrower lobe than in the preceding Insects, and frequently present a corneous tooth on the inner margin.

PLATYCERUS, Lat.

The palpi, maxillary lobes, and ligula are proportionally shorter than in the preceding subgenus. The mentum forms a transversal square, while in the preceding it is frequently semicircular. It conceals the whole base of the jaws. The mandibles are generally short(2).

The club of the antennæ in the remaining Lucanides is composed of the seven last joints.

SYNDESUS, Mac L.—*Sinodendron*, Fab.

A small horn on the anterior of the thorax, which is also, as in most of the Passali, marked with a median sulcus. Its separation from the abdomen is also more strongly marked than in Lucanus. The two posterior legs are placed further behind. The antennæ are less geniculate(3).

The Lucanides of our second section have their antennæ simply arcuated, or but slightly geniculate and pilose; the labrum always exposed, crustaceous, and transversal; the mandibles strong and much dentated, but without any very remarkable sexual difference; the maxillæ entirely corneous with at least two strong teeth; the ligula equally corneous or very hard, situated in a superior emargination of the mentum, and terminated by three points; the abdomen pediculated, presenting the scutellum above, and separated from the thorax by a strangulation or considerable interval. They form the genus

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(1) I unite the *Ceruchus* and *Platycerus*, Mac Leay, with Lucanus. The proportions of the mandibles, palpi, maxillary lobes, ligula and club of the antennæ, do not furnish constant and rigorous characters.

(2) The *Lucanus parallelipedus* of Fabricius, forming, with another species, the genus *Dorcus* of Mac Leay. I also unite to Platycerus the *Nigidius*, *Ægus*, and *Figulus* of the same learned entomologist.

(3) *Synodendron cornutum*, Fab.; Donov., Insect. of New Holl., tab. I, 4; *Syndesus cornutus*, Mac L., Hor. Entom. I, p. 104.

PASSALUS, Fab.

Restricted by M. Mac Leay to those species in which the club of the antennæ consists of but three joints, where the labrum forms a transversal square, and the maxillæ have three strong terminal teeth, and two on the inner side in place of the interior lobe.

The species, in which the club is composed of five joints, the labrum is very short, and the maxillæ have but two teeth, one terminal and the other on the inner side, form his genus PAXILLUS.

Finally, in his family of the Passalides, he unites to the preceding the genus *Chiron*, which we have placed in the tribe of the Coprophagi(1).

These Insects are foreign to Europe, and as it would appear, to Africa, being chiefly found in the eastern parts of Asia, and particularly in America. Madame Merian says, that the larva of the species figured by her lives on the roots of the sweet potato. The perfect Insect is not uncommon in the sugar-houses(2).

In the second general section of the Coleoptera, or the HETEROMERA, we find five joints in the four first tarsi, and one less in the two last.

These Insects all feed on vegetable substances. M. Leon Dufour—Annal. des Sc. Nat., VI, p. 181—has observed that the texture of the male organs of generation approximates them to those of the Scarabæides and Clavicornes; their testes consist of spermatic capsules or sacculi.

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(1) Hor. Entom. I, p. 105, et seq.

(2) See Fabricius, Syst. Eleuth., II, p. 155; Web., Obser. Entom.; Palis. de Beauv., Insect. d'Afr. et d'Amér.; Lat., Gener. Crust. et Insect., II, p. 136; and Schœnh., Synon., I, iii, p. 331, and Append., p. 143, 144.

We will divide this section into four great families(1), the two first of which are somewhat analogous to the first pentamerous Coleoptera, in an excrementitious apparatus discovered in several of their genera by the same savant; their chylific ventricle also is frequently covered with papillæ. In several of these Insects, we find the vestiges of another secreting apparatus but seldom observed among Coleoptera, that which is denominated the salivary apparatus. The hepatic vessels, as in the Pentamera, with but few exceptions, are six in number, and have two insertions distant from each other: "at one extremity," says M. Dufour, "they are inserted by six insulated ends round the collar, which terminates the chylific ventricle; the other opens into the origin of the cæcum by trunks, varying in number according to the family and genus."

In some, where the elytra are generally solid and hard, and the hooks of the tarsi are almost always simple, the head is ovoid or oval, susceptible of being received posteriorly into the thorax, or sometimes narrowed behind, but not abruptly, and without a neck at its base. Many of these Heteromera avoid the light. This division will comprise the three following families.

FAMILY I.

MELASOMA.

This family consists of unmixed black or cinereous coloured Insects, (from which is derived the name of the division,) mostly apterous, and frequently with soldered elytra. Their antennæ, entirely or partly granose, almost of equal thickness throughout or slightly inflated at the extremity, and the third joint wholly elongated, are inserted under the projecting edges of the head. The mandibles are bifid or emarginated at the extremity; the inner side of their maxillæ is furnished with a corneous tooth or hook, all the joints of the tarsi are entire, and the eyes oblong and but very slightly prominent, a circumstance, which, according to M. Marcel de Serres, indicates their nocturnal habits. Almost all these Insects live on the ground, either in sand, or under stones, and frequently in cellars, stables, and other dark places about our habitations.

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(1) In a natural order, the fourth is connected with the first by the Helopii which Linnæus places in his genus Tenebrio. It is also evident that the Tenebrios lead to Phaleria, Diaperis, &c., or to our second family.

According to M. Dufour—Ann. des Sc. Nat., V, p. 276—the biliary vessels are inserted into the inferior face of the cæcum by a single trunk, resulting from the confluence of two very short branches, formed by the union of three biliary vessels. The bile is yellow, sometimes brown or violet. The alimentary canal—Ann. des Sc. Nat., III, p. 478—is long, and its length in our first tribe, or the Pimeliariæ, is thrice that of the body; the esophagus is long and leads to a crop smooth or glabrous externally, that is more developed in these latter Insects, where it forms an ovoid sac lodged in the pectus; it is marked internally with longitudinal plicæ or fleshy columns, terminating in some—*Erodii*, *Pimeliæ*—near the chylific ventricle, at a valve formed of four principal corneous, oval and connivent parts; the chylific ventricle is elongated, flexuous or doubled, most commonly covered with little papillæ resembling projecting points, and terminated by a small collar, callous within, which receives the first insertion of the biliary vessels. The same anatomist has observed in some subgenera of this family—*Blaps*, *Asida*—a salivary apparatus, consisting of two floating vessels or tubes, sometimes perfectly simple—*Asida*—and at others irregularly ramous—*Blaps*;—he is also convinced that they exist in the other Pimeliariæ. M. Marcel de Serres—Observations sur les usages des diverses parties du tube intestinal des Insectes, Ann. du Mus. d'Hist. Nat.—has carefully studied the texture of the tunics of the alimentary canal(1). The adipose tissue is more abundant in these Heteromera than in the following ones, which enables them, even when transfixed and confined with a pin, to live six months without food, a fact I have witnessed in an Akis.

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(1) What M. Dufour styles the chylific ventricle, M. de Serres calls the stomach, and relative to other Insects the duodenum., What he calls the small intestine is considered by the first as the cæcum. According to M. Dufour, M. M. de Serres has not mentioned the crop of the Melasoma, although in Akis and Pimelia it is very apparent.

Our first division of this family, which in the Linnæan system forms the genus TENEBRIO, is founded on the presence or absence of wings.

Of those which are deprived of these organs, and in which the elytra are generally soldered, some have the palpi almost filiform, or terminated by a moderately dilated joint, and do not form a distinctly securiform or triangular club. They will compose a first tribe, that of the PIMELIARIÆ, so named from the genus

PIMELIA, Fab.,

Which is the most numerous of the whole.

Sometimes the mentum is more or less cordiform, the superior margin either emarginated in the middle, and divided as it were into two short and rounded lobes, or broadly emarginated or widened.

Here, the two last joints of the antennæ, or the tenth or eleventh, always distinct, sometimes unite to form an ovoid or pyriform body, or are evidently separated from each other. The superior margin of the mentum is rounded and emarginated in the middle, or as if divided into two festoons.

These have the anterior margin of the head almost straight or projecting but slightly in the middle, without a profound emargination for the reception of the mentum, and its lateral margin simply and slightly dilated above the insertion of the antennæ; the head does not seem to be sensibly narrowed behind, nor widened and truncated before., The thorax is not cordiform, deeply emarginated before and truncated posteriorly.

From these last, we may separate those in which the anterior margin of the head is straight, or nearly so, without any angular or dentiform dilatation in the middle, in which the almost square and moderate sized labrum is entirely exposed, the thorax is transversal, and the abdomen extremely voluminous and inflated.

Those, in which the body is more or less ovoid or oval, the thorax narrower than the abdomen even at base, generally convex, without acute prolongations at the posterior angles, and without a posterior projection to the præsternum, compose the subgenus properly called

PIMELIA—*Tenebrio*, Lin.

These Heteromera are proper to the countries situated round the basin of the Mediterranean, to western and southern Asia, and to Africa. They are not found in India, or at least none have as yet been discovered there.

Some species, usually more elongated, have the mentum exposed, and the antennæ slightly and insensibly enlarged at the extremity; the three last joints do not form a club, divided into two equal portions, the last of which is composed of the tenth and last joint confounded together.

In some of these, the abdomen is proportionally wider and more voluminous, and the legs are less elongated; the anterior tibiæ are in the form of a reversed triangle, elongated, and have the exterior angle of their extremity prolonged; the spurs are stout and the tarsi short.

M. Fischer—Entomog. Russ. Imp.—has divided them into three genera, *Pimelia*, *Platyopus* and *Diesia*, but their characters, being only founded on the greater or less projection of the last joint of the antennæ and the dentations of the anterior tibiæ, do not appear to us sufficiently determinate. The eleventh and last joint of the antennæ is most distinct in the Diesiæ. The anterior tibiæ are much dentated exteriorly in Platyopa, where the thorax forms a transversal square, the base of the elytra is straight, and the exterior angles or the shoulders slightly project. Among the Pimeliæ, properly so called of this author, or those in which the eleventh and last joint of the antennæ unites, or is almost confounded with the preceding one, where the thorax is almost semilunar and convex, and the abdomen nearly ovoid or globular, is placed the

P. 2-punctata, Fab.; Oliv., Col., III, 59, i, 1. Length eight lines; glossy-black; thorax granulated, with two large punctures in the middle, united in some individuals in a transverse line; elytra granulated, each with four elevated lines, the lateral carina included, not visibly dentated, of which the two inner ones are shorter; suture elevated. Common on the shores of the Mediterranean.

The *Tenebrio muricatus*, L., is a different species—Schœnh., Synon. Insect, I, tab. III, 9.

P. coronata, Oliv., Ib., II, 17. Fifteen lines in length; blackish; covered with reddish-brown hairs; a range of posteriorly curved spines on the lateral carina of each elytron.

M. Payraudeau has discovered in Corsica a new species—*Payraudii*—allied to the first, but with a more elongated abdomen, and more strongly granulated elytra, on which the two inner elevated lines are almost effaced.

In other species,—TRACHYDERMA, Lat.,—the abdomen is proportionally narrower and more elongated, and frequently much compressed laterally; the legs are long, and the tibiæ, the anterior ones not excepted, slender, narrow, and terminated by small spurs. They are usually found further south than the preceding species(1).

A last division of the Pimeliæ—CRYPTOCHYLE, Lat.—is composed of species in which the body is relatively shorter or more thick-set, the mentum covered by the præsternum, and the antennæ are abruptly terminated by a club, divided into two parts, one formed by the ninth joint and the other by the two following ones, which are confounded together. These species appear to be concentrated in the southern extremity of Africa(2).

Under the generic appellation of Erodius, were formerly united certain Pimelariæ, closely allied to the preceding ones, but in which the body is ovoid, short, arcuated or gibbous above, the thorax short, as wide posteriorly as the base of the elytra, and terminated on each side by an acute angle; and the præsternum dilated posteriorly in the manner of a lamina or point, with its posterior extremity resting on the mesosternum.

These Erodii now form three subgenera. In

ERODIUS, Lat.

Or Erodius properly so called, the two last joints of the antennæ are united and form a small globuliform club, the anterior tibiæ have a stout tooth near the middle of their outer side, and another on the same side at the extremity, and the mentum is incased (*encadré*) inferiorly and covers the base of the maxillæ. Their body is usually convex(3).

ZOPHOSIS, Lat.—*Erodius*, Fab. Oliv.

Where the antennæ are almost filiform or enlarge insensibly towards the end, with the tenth joint very distinct from the preceding, somewhat larger and almost ovoid, and where the anterior tibiæ as well as the following ones have no tooth near the middle of the outer side. The mentum is encased (encadré) inferiorly, and covers the base of the maxillæ. The third joint of the antennæ is hardly longer than the second, and the ninth and tenth are almost turbiniform(1). Those of the third, or the

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(1) The Pimeliæ *longipes*, *hispida*, *morbillosa*, &c., of Fabricius; the *Pim. anomala* of Fischer.

(2) The Pimeliæ *maculata* and *minuta*, Fab. For the other Pimeliæ, see Olivier, Schœnherr, and Fischer.

(3) The Erodii *bilineatus*, *gibbus*, *lævigatus*, Oliv., Col., III, No. 63. See Lat., Gener. Crust. et Insect., II, p. 145, and the Catalogue, &c. of Dejean.

NYCTELIA, Lat.—*Zophosis*, Germ.

Are almost similar to the Zophoses, but the third joint of their antennæ is much longer than the preceding one; the following, as well as the ninth and tenth, is nearly globular. The base of the maxillæ is exposed. Besides this, these Insects are peculiar to South America, whilst the Zophoses and Erodii are exclusively confined to the western and southern parts of Asia, and the south of Europe and Africa(2).

Other Pimelariæ, terminating the subdivision of those in which the labrum is not received into a deep emargination of the anterior border of the head, and in which this last part of the body is neither truncated before nor narrowed behind, are distinguished from the preceding by the following characters. The middle of the anterior margin of this part projects in the manner of an angle or tooth. The labrum does not appear when the mandibles are closed, or but very little. The thorax is sometimes trapezoidal, almost as long as it is broad, and at others almost orbicular or nearly semicircular. The antennæ are filiform, and the eleventh and last joint is always very distinct from the preceding one. The mentum is incased inferiorly and covers the base of the maxillæ. The præsternum is slightly prolonged into a point in several. These Insects, like those of the two following subdivisions, are exclusively peculiar to the hot and western countries of the eastern continent.

HEGETER, Lat.

The thorax forming a trapezium, almost as wide at the posterior margin as the base of the elytra, and in contact with it throughout; the last joint of the antennæ somewhat smaller than the preceding one(3).

TENTYRIA, Lat.—*Akis*, Fab.

The thorax almost orbicular, sometimes narrower than the abdomen, and at others of equal width, but rounded at the posterior angles, and leaving an hiatus between them and the base of the elytra. The last joint of the antennæ is at least as large as the preceding one(1).

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(1) See Lat., Gener. Crust. et Insect., II, p. 146.

(2) *Zophosis nodosa*, Germ., Insect. Spec. Nov., p. 133.

(3) Lat., Gener. Crust. et Insect., II, p. 157; I, ix, 2;—*Pimelia silphoides?* Oliv.;—*Gnathosia glabra*, Fischer, Entom. Russ., II, xx, 8.

Other Pimeliariæ are removed from the preceding ones by the form of their head and thorax. The first is a kind of square, more or less narrowed behind, and the middle of its anterior edge presents an emargination which receives the labrum. The dilatation of the lateral margin covering the base of the antennæ is greater, and prolonged to the anterior edge. The latter organs are always composed of eleven very distinct joints, almost cylindrical, the last few excepted, with the third very long. The middle of the outer side of the mandibles is deeply excavated, and the inferior sides of the head, forming the lateral casing or frame of the maxillæ and mentum, terminate in a point, or in the manner of a tooth. The thorax is in the form of a truncated heart, and well emarginated before in most of them. These Pimeliariæ comprise a great portion of the genus

Akis, Fab.,

Now restricted to those species in which the thorax is wider than the head, strongly emarginated before, short, its posterior margin widely truncated, and the lateral edges turned up(2).

> Another species—*A. collaris*, Fab.—in which the head measured anteriorly is rather wider than the thorax, more prolonged posteriorly, and slightly strangulated at base in the manner of a neck, and where the thorax is much narrower throughout than the abdomen, small, convex, inclined and not turned up on the sides, forms the genus

Elenophorus, Meger. Dej.,

Where the antennæ are also somewhat longer than in Akis, and the eyes are narrower and emarginated.

The last Pimeliariæ of that division, in which the mentum is emarginated, are distinguished from the preceding ones by the manner in which it terminates: instead of being rounded and divided into two festoons, it is slightly emarginate or concave, with the lateral angles acute, and proportionally shorter and narrower at its base or more cordiform; it covers the maxillæ. The eleventh joint of the antennæ is not apparent; they are terminated by the tenth, which is somewhat larger than the preceding ones, turbiniform, and obliquely truncated at the end. In the form of the head, its anterior emargination, and frequently also in the figure of the thorax, these Insects closely resemble the true Akis. In

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(1) Lat., Gener. Crust. et Insect., II, 154; the *Akis glabra*, *punctata*, *abbreviata*, *angustata*, *orbiculata*, of Fabricius. I also think we should refer the Tagonæ—*Tagona*, Fischer, Entom. Russ., I, xvi, 8, 9—to this subgenus.

(2) The first division of the *Akis*, Fab. See also Fischer, Entom, Russ., I, xv, 7, 8, 9.

EURYCHORA, Thunb.

The body is oval with acute and ciliated edges; the thorax semicircular, and receives the head into an anterior emargination, the abdomen almost cordiform. The antennæ are composed of linear joints, compressed or angular, the third of which is longer than the preceding and following ones(1).

ADELOSTOMA, Dup.

These Insects have a narrow and elongated body, with an almost square thorax, slightly narrowed posteriorly; the antennæ tolerably stout, almost perfoliated, and all the joints, the last excepted, nearly lenticular and equal. Their labrum, mandibles and palpi are concealed(2).

We will terminate the Pimeliariæ with those in which the superior edge of the square mentum is neither emarginated nor widened. Their body is always oblong, and the thorax sometimes almost square, rounded or dilated, and at others narrow, elongated, almost cylindrical, and the abdomen ovoid or oval. The antennæ always consist of eleven distinct joints. The anterior thighs are inflated, and even sometimes dentated in several or at least in one of the sexes. These Insects evidently form the passage from this tribe to the following one.

Sometimes the antennæ are entirely or almost entirely granose or composed of short joints, either ovoid or globular, turbiniform, or almost hemispherical.

Of these, some resemble the Pimeliariæ of the last subgenera in the dilatation and prolongation of the lateral margin of the head. Their labrum is very short or projects but little. The lateral borders of the thorax are straight or simply arcuated and rounded, and without any angular or dentiform dilatation. The eyes are but slightly protuberant.

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(1) Lat., Gener. Crust. et Insect., II, p. 150; Schœnh., Synon. Insect., I, ii, 5;—Schœnh., Synon. Insect. I, i, tab. 2, 5.

(2) *Adelostoma sulcatum*, Duponchel, Mem. de la Soc. Lin. de Paris, 1827, XII, A, B, C; an Insect found in the environs of Cadiz by the son of that savant, at Tangier by M. Goudot, Jun., but brought from Syria a long time ago by M. Labillardière.

Here the thorax is narrow, either cylindrical or in the form of an elongated heart, truncated at both ends. Such are

Tagenia, Lat.—*Stenosis*, Herbst.—*Akis*, Fab.

Where the antennæ are almost perfoliate with the third joint hardly longer than the following ones, and the eleventh or last very small or united with the preceding one. The head is elongated posteriorly, and borne on a kind of neck or knot. The thorax is in the form of an elongated heart truncated at both ends. The abdomen is oval(1).

Psammetichus, Lat.

Where the antennæ are composed of turbiniform joints, of which the third is much longer than the following ones, and the eleventh or last, as large as the preceding, is very distinct. The head and thorax form a long square of equal width. The abdomen is almost oval, and truncated at its base(2).

There, the thorax is at least as wide as the abdomen, and of an almost orbicular or square form, rounded laterally, and either isometrical or wider than long.

Scaurus, Fab.

Where the last joint of the antennæ is ovoido-conical and elongated; where the thorax is almost isometrical, and where the anterior thighs are strongly inflated and frequently dentated in the males. The tibiæ are long and narrow.

These Insects are peculiar to the hot and western parts of the eastern continent(3).

Scotobius, Germ.

Where the last joint of the antennæ is hardly longer than the preceding and in the form of a reversed top; where the thorax is evidently wider than it is long, and the lateral edges are strongly arcuated; where the thighs differ but little in size, and when the anterior tibiæ are in the form of an elongated triangle, and angular.

These Heteromera are peculiar to South America(4).

The other Pimeliariæ, with moniliform antennæ and the mentum entire, are remarkable for the lateral, angular or strongly dentiform dilatations of the thorax. The middle of the back presents a sulcated carina terminated anteriorly in the manner of a rounded and bilobate gibbosity. The lateral margins of the head are briefly dilated. The labrum is entirely exposed and of an ordinary size. The eyes are more prominent than in the other Pimeliariæ; the antennæ, besides, are pilose or pubescent.

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(1) Lat., Gener. Crust. et Insect., II, p. 149; Herbst., Col., VIII, cxxvii, 1—3.

(2) A subgenus established on some undescribed Insects from Chili.

(3) Oliv., Col., III, No. 62; Lat., Gener. Crust. et Insect., II, 159; Encyc. Méthod., article *Scaure*.

(4) Germ., Insect. Spec. Nov., p. 136.

The elytra are very unequal.

SEPIDIUM, Fab.

They are found in the southern countries of Europe and in Africa(1).

The last Pimeliariæ, the mentum as in the preceding ones, being unemarginate superiorly, are removed from the latter by the form of the joints of their antennæ; they are mostly cylindrical or in the form of an elongated and reversed cone; the three or four last are alone rounded, and either ovoidal, turbiniform or hemispherical. The labrum is entirely exposed, and the marginal dilatation of the head covering the origin of these organs is but slightly prolonged, as in Sepidium. The eyes are nearly round or oval, entire or but slightly emarginate and prominent; the thorax is depressed, sometimes dilated on each side in the manner of an angle, sometimes narrower, but sulcated and carinated above; the last joint of the antennæ is evidently longer and thicker than the preceding.

These Insects are proper to the Cape of Good Hope. Such are the

TRACHYNOTUS, Lat.—*Sepidium*, Fab.(2)

There, the eyes are narrow, elongated, and almost flat. The thorax is convex, almost orbicular, emarginate before, truncated posteriorly, without angular dilatations and dorsal carina. The second joint of the antennæ is, at most, the size of the preceding.

MOLURIS, Lat.—*Pimelia*, Fab. Oliv.—*Psammodes*(3), Kirby.

The second tribe of the Melasoma, that of the BLAPSIDES, receives its denomination from the genus BLAPS of Fabricius.

The maxillary palpi terminate by a manifestly securiform

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(1) The Sepid. *tricuspidatum*, *variegatum*, and *cristatum* of Fabricius.

(2) The Sepid. *reticulatum*, *rugosum*, *vittatum* of Fabricius; the *S. acuminatum* of Schœnherr. A species, which Count Dejean calls the *cucurlioides*, and figured by De Geer, forms a separate division.

(3) The Pimeliæ *striata*, *unicolor*, *gibba* of Fabricius. See Lat., Gener. Crust. et Insect., II, p. 148;—*Psammodes longicornis*, Kirb., Lin. Trans, XII, xxi, 13.

or triangular joint. M. Dufour has observed, that in this genus as well as in that of Asida, the crop is less developed than in the Pimeliariæ, and that the little valve, at which it terminates posteriorly, is not formed of those four principal corneous or connivent pieces of which it is composed in the preceding tribe, but by the approximation of its interior fleshy columns. The chylific ventricle is proportionally longer, and the spermatic capsules are less numerous. These Insects, according to the same naturalist, are provided with a double excrementitious secreting apparatus, totally differing in structure from that of the Pentamera. It consists of two tolerably large oblong bladders, situated altogether under the viscera of digestion and generation, closely approximated to each other, with extremely thin parietes, and surrounded with adhering vascular folds more or less turgid; the precise point of their insertion, from the utter impossibility of unrolling them, can scarcely be determined. The same remark applies to the canals by which the secreted liquid is evacuated; they are concealed by a sort of membranous diaphragm, which, by means of a fleshy panicle, is applied to the last segment of the venter. The secreted fluid issues laterally from the last annulus, and not from its extremity; it is ejected to the distance of seven or eight inches, is brownish, acrid, extremely irritating, and has a peculiar and penetrating odour.

This tribe is formed of a single genus, that of

BLAPS.

Those, in which the body is generally oblong, with the abdomen clasped laterally by the elytra, that are most usually narrowed towards the end, and terminated in a point or in the manner of a tail, and in which the tarsi are almost similar in the two sexes, and without any notable dilatation, will form our first division.

The mentum in some is small, or hardly occupying in width more than the third of that of the under part of the head, and almost square or orbicular.

Here, all the tibiæ are slender, without strong ridges or teeth on the outer side. The thorax is never dilated anteriorly, nor in the form of a widely truncated heart. In

Oxura, Kirb.

The body is narrow and elongated; the thorax longer than it is wide, ovoid, and truncated at both ends; and the intermediate joints of the antennæ long and cylindrical(1). In

Acanthomera, Lat.—*Pimelia*, Fab.

The thorax is almost orbicular and transversal; the abdomen nearly globular; the third joint of the antennæ cylindrical and much longer than the following ones, which are almost of the same form, and the three last at most granose(2).

Misolampus, Lat—*Pimelia*, Herbst.

Where the thorax is almost globular and the abdomen nearly ovoid; the third and fourth joints of the antennæ are equal, and cylindrical, the eighth and two following ones a little stouter, almost turbiniform, and the eleventh or last larger and ovoid(3). In

Blaps, Fab.

Or Blaps properly so called, the thorax is almost square and plane, or but slightly convex. The abdomen is oval, truncated transversely at base, and more or less elongated. The elytra of most of them are narrowed and prolonged into a point, those of the males especially. The third joint of the antennæ is cylindrical and much longer than the following ones; the latter, or at least the three antepenultimate ones, are granose; the last is ovoid and short.

With those species in which the body and abdomen are proportionally less elongated and wider, in which the elytra of the females terminate in a very short point, and where the thorax is almost plane, are arranged the

B. mortisaga, Oliv., Col., III, 60, 1, 2, 6; *Tenebrio mortisaga*, L. Length, ten lines; black, but slightly lustrous; smooth; simply punctured above; thorax almost square, offering on each side of its posterior margin vestiges of a small flattened border; extremity of the elytra forming a short and obtuse point. In dark and filthy localities near privies, and frequently in houses.

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(1) *Oxura setosa*, Kirby, Lin. Trans., XII, xxii, 3.

(2) *Pimelia dentipes*, Fab., and some other species. The anterior thighs are inflated and dentated; the body is very unequal and cinereous; the spurs of the tibiæ very small.

(3) Lat., Gener. Crust. et Insect., II, p. 160, and I, x, 8, *Pimelia gibbula*, Herbst., Col., VIII, cxx, 7.

B. lævigata, Fab. This species might constitute a particular subgenus. Its body is much shorter than that of the others and extremely convex or gibbous. The antennæ are granose from the fourth joint. The anterior tibiæ terminate in a stout point or spine formed by a spur.

It is stated by Fabricius that the Turkish women inhabiting Egypt, where the Insect is very common, eat the *Blaps sulcata*, cooked with butter, in order to become fat. The same author also says that it is used as a remedy for the head-ach, and the sting of a Scorpion(1).

There, all the tibiæ are angular with longitudinal ridges; the two anterior are wider and strongly dentated exteriorly. The thorax is dilated anteriorly, cordiform, and widely truncated.

GONOPUS, Lat.

The third joint of the antennæ is elongated and cylindrical as well as the two or three following ones; those which succeed are granose; the last is ovoid and somewhat longer than the penultimate. The anterior margin of the head is concave, and the mentum forms a transverse square. The inferior side of the thighs is trenchant with a sulcus; the two anterior are furnished with a tooth, and the four posterior tibiæ are narrow, arcuated, and somewhat dentated; the tarsi are glabrous(2).

The other Insects of this tribe, with similar legs in both sexes, differ from the preceding in their mentum, which occupies transversely the greater portion of the under part of the head, and has the form of a heart truncated inferiorly or at base. The thorax is always transversal, emarginate or concave before and arcuated laterally, either trapezoidal and widest posteriorly, or strongly dilated laterally and narrowed towards the posterior angles. The labrum is emarginated.

Most of these Insects are cinereous, and live on the ground in sandy localities.

Sometimes the thorax is widened before, or near the middle of its sides, and narrowed posteriorly. The base of the jaws is exposed. In

HETEROSCELIS, Lat.

We observe two stout teeth on the outer side of the four first tibiæ, one in the middle, and the other terminal. The posterior extremity of the præsternum is prolonged, laminiform, flattened, and received into an emargination of the mesosternum. The body is oval, and rounded at both ends; the lateral edges of the thorax are strongly arcuated, and simply narrowed near the posterior angles. The antennæ are slightly and gradually enlarged towards the extremity(1).

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(1) The Blaps *gages*, *sulcata* of Fabricius. See the Catal. de la Coll., &c., of Count Dejean.

(2) *Blaps tibialis*, Fab.

MACHLA, Herbst.

The antennæ terminated by a little globuliform club composed of the three last joints; they can be received into cavities underneath the sides of the thorax, which are extremely thick and rounded(2). In

SCOTINUS, Kirb.

The antennæ are also terminated by a little club, but in which the two last joints are almost confounded; they are not susceptible of being received into particular cavities. The thorax is dilated before(3).

Sometimes the thorax is almost trapezoidal, gradually arcuated throughout the whole extent of its lateral edges, and is not abruptly narrowed posteriorly. The mentum covers the base of the maxillæ. The two last joints of the antennæ are united in a small club. Such are the

ASIDA, Lat.(4)

Next come Blapsides, with an oval and slightly elongated body, in which the lateral curve of the elytra is narrow, and extends but little underneath; in which the thorax is always transversal, almost square or trapezoidal, and the lateral edges arcuated; and which are still more remarkable for the sexual difference in their tarsi, the two or four anterior ones being most dilated in the males(5).

These Insects frequent sandy localities. The two anterior tibiæ are usually wider, dilated triangularly at the extremity, and fitted for digging.

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(1) *Pimelia dentipes*, Fab.; *Platynotus reticulatus*, ejusd.;—*Pimelia obscura*, Oliv.; Insects from the Cape of Good Hope.

(2) *Platynotus serratus*, Fab.

(3) *Scotinus crenicollis*, Kirb., Lin. Trans. XII, xxi, 14, a subgenus peculiar to South America.

(4) Lat., Gener. Crust. et Insect., II, p. 155. See the Catalogue, &c., of Dejean, p. 65. The *Platynotus undatus* of Fabricius differs but little from the *A. grisea*. That author is, I think, mistaken as to its habitat.—*Plat. lævigatus*, Id.

(5) The inferior surface of these tarsi is usually silky or furnished with a brush.

Here the anterior edge of the head is always emarginated. The two anterior tarsi of the males are alone manifestly wider, or more dilated than the following ones.

PEDINUS, Lat.

M. Megerle and count Dejean have divided them into several other subgenera, but without giving their characters.

Those, where the males have the four first joints of the anterior tarsi of the same width, with the radical triangular, the three following transversal and almost equal, all the tibiæ narrow and elongated, the thorax narrowed posteriorly and terminated by acute angles, form the genus OPATRINUS of Count Dejean.

They all belong to America(1).

Those, where the same tarsi, and in the same sex have the first joint, and particularly the fourth, sensibly narrower or smaller than the two that are intermediate, and in which the thorax is narrowed near the posterior angles, form four other subgenera, the characters of which are so faint and blended that they may all be united in one, that of DENDARUS, Meg. Dej.

In some species, as in Opatrinus, the tibiæ are narrow, elongated, but slightly dilated at their extremity and almost identical in both sexes; and the thorax is abruptly narrowed on each side near the posterior angles, which form a small acute tooth: they form the *Dendari*, properly so called(2).

In the following, the four anterior tibiæ, or at least the two first, are dilated triangularly at the extremity. The body is oval. Such is the HELIOPHILUS of Count Dejean. Sometimes the thorax terminates insensibly on each side in an acute angle. The body is proportionally shorter and wider.

Certain species, with a large thorax hardly wider than it is long, with a strong lateral border, and in which the body is but slightly convex above, compose the genus EURYNOTUS of Kirby(3).

Others, in which the body is evidently more convex above, and the thorax is transversal and but very slightly bordered, form the ISOCERUS, Meg. Dej.(4)

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(1) *Blaps clathrata*, Fab.;—*B. punctata*, Fab., and perhaps his *Platynotus dilatatus*.

(2) See Catalogue, &c., Dej., p. 65, and the *Platynotus excavatus*, and *crenatus*, Fab.

(3) *Eurynotus muricatus*, Kirb., Lin. Trans., XII, xxii, 1. See *Platynotus striatus*, Schœnh., Synon. Insect., I, 1, tab. ii, 6.

(4) Catalogue, &c., Dej., p. 65.

In the males of the last of the Pedini, the three first joints of the two anterior tarsi, always strongly dilated, diminish progressively in breadth, and the fourth is very small. The posterior thighs of the same individuals are concave and silky underneath(1); the body is oval and the thorax slightly bordered, widening from before posteriorly or slightly narrowed behind, always terminated posteriorly and insensibly by a prolonged and pointed angle. Such are the true Pedini of Dejean or the PEDINUS, Dej.(2)

There, the anterior margin of the head is entire or unemarginate in several. The four anterior tarsi of the males are equally, or almost equally dilated. The form of the body, and that of the thorax in particular, is still similar to that of the last Pedini.

Those, in which the anterior margin of the head still presents an emargination, form the genus

BLAPTINUS, Dej.(3)

Those in which it is entire or unemarginate, the

PLATYSCELIS, Lat.(4)

We now come to Melasoma, provided with wings. Their body is usually oval or oblong, depressed or but slightly elevated; their thorax square or trapezoidal, and its posterior extremity as wide as the abdomen. The palpi are larger at the extremity; the last joint of the maxillary palpi has the figure of a reversed triangle, or is securiform; the mentum is but slightly extended in width(5), and leaves the base of the maxillæ exposed.

These Insects compose the third and last tribe of the Melasoma, that of the TENEBRIONITES, formed of the single genus

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(1) The underpart of the same thighs is also silky in the male Heliophili.

(2) Catalogue, &c., Dej., p. 65.

(3) Dej., Catalogue, &c., p. 66.—*Blaps tibidens*, Schœnh., Synon. Insect., I, i, tab., ii, 8.

(4) Dej., Ibid.; Fisch., Entomog. Russ., II, xx, 1—5.

(5) The Epitragi, by their jaws, which are armed on the inner side with a tooth, in a systematic arrangement, should be placed in this tribe; they would be removed from all the subgenera of which it is composed, by their much larger mentum that covers the origin of the maxillæ: but in a natural order, it appears to me they should be placed near Helops.

TENEBRIO,

As originally arranged by Fabricius, and to which we will annex his *Opatrum* and *Orthocera;* they will serve for types of as many particular divisions.

1. Those in which the body is oval; the thorax nearly trapezoidal, arcuated laterally, or forming a semioval, truncated anteriorly, wider than the abdomen, at least at its posterior margin, but slightly or not at all bordered; in which the maxillary palpi terminate by a securiform joint or one of an analogous figure, and where the antennæ insensibly enlarge. In

CRYPTICUS, Lat.—*Blaps*, Fab.

The body is convex and smooth above; the head exposed or but slightly received into the emargination of the thorax, and its anterior edge unemarginate; the eyes exterior or entirely outside of the anterior concavity of the thorax; and this last part insensibly inclined on the sides and but slightly emarginated before. The antennæ are almost as long as the thorax, and most of their joints in the form of a reversed heart or turbiniform, the penultimates alone being more rounded or almost granose, but not transversal. The tibiæ are always narrow and elongated, and the spurs of their extremity tolerably salient(1).

OPATRUM, Fab. Dej.—*Phylan*, Meg.

The body generally less elevated and even frequently depressed; the head and eyes received posteriorly into a deep notch in the thorax, with a small anterior emargination in which the labrum is fixed.

The thorax is depressed along its sides; the antennæ are shorter than the thorax, mostly granose, and the last joints lenticular and transversal.

The elytra are scabrous or striated. The spurs of the tibiæ are very small, and the two anterior are broad and triangular in several.

O. sabulosum; Silpha sabulosa, L.; Oliv., Col., III, 56, i, 4. Length of the body four lines; black; usually appearing of a cinereous-grey above; oval; thorax arcuated laterally, and rather wider in its middle than the abdomen. Each elytron has three longitudinal elevated lines, each of which, on each side, is accompanied by a range of little tubercles, arranged alternately and frequently uniting with them; between the exterior margin and the first line, and between the last and the suture, there is also a series of similar tubercles. The anterior tibiæ are wider and triangular. Very common in all Europe in sandy localities, and appearing with the first fine weather in spring(1).

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(1) *Pedinus glaber*, Lat., Gener. Crust. et Insect., II, p. 164; *Helops glaber*, Oliv., Col., III, 58, ii, 12; *Blaps glabra*, Fab., and some other undescribed species from Spain and the Cape of Good Hope.

2. Those in which the body is narrow and elongated, almost of the same width posteriorly or wider; where the thorax is nearly square, and at least almost as long as it is broad, and where the antennæ form a thick club, or are abruptly dilated at the extremity.

In some, the antennæ are thick, cylindrical or fusiform, perfoliate, pilose, and apparently composed of but ten joints, the eleventh or last being very short and but little distinct; the second is as large as the following one.

CORTICUS, Dej.—*Sarrotrium*, Germ.

Where the antennæ are cylindrical and terminated by a larger joint, forming a little club(2).

ORTHOCERUS, Lat.—*Sarrotrium*, Illig.

Where the antennæ, wider in the middle, form a densely pilose club, with most of the joints transversal, and the last much narrower than the preceding ones(3).

The antennæ of the others are of an ordinary size, simply granose, neither perfoliate nor pilose, and consist of eleven distinct joints.

CHIROSCELIS, Lam.

Two stout teeth on the outer side of the two first tibiæ; antennæ terminating in a small and nearly globular, transverse club, formed by the two last joints(4).

TOXICUM, Lat.

The tibiæ simple; club of the antennæ compressed and formed by the three last joints; head triangular; thorax nearly square, and almost isometrical(1).

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(1) The *Opatr.*, 7, 8, 10, Oliv., Ib. See Encyc. Méthod., article *Opatrum*, and the Catalogue, &c., of Dejean. The genus *Phylan*, Meg. and Dej., presents no character which clearly distinguishes it from that of Opatrum.

(2) *Sarrotrium celtis*, Germ., Insect. Spec. Nov., p. 145.

(3) *Hispa mutica*, L.; Panz., Faun. Insect. Germ., I, 8.

(4) *Chiroscelis bifenestra*, Lam., Ann. du Mus. d'Hist. Nat., No. 16, XXII, 2;—*Tenebrio digitatus*, Fab.

Boros, Herbst.—*Hypophlæus*, Fab.

The tibiæ simple, and the club of the antennæ compressed and formed by the three last joints; but the body is almost linear, the head oval and narrowed posteriorly, the thorax oval and truncated at each extremity, and the last joint of the maxillary palpi forming a truncated ovoid and but slightly inflated(2).

3. Those in which the body is equally narrow and elongated, and the thorax almost square, but where the antennæ are of the ordinary thickness, and are not abruptly terminated by a club.

The two anterior thighs are stout, and the tibiæ narrow and curved, or arcuated.

Here the penultimate joint is perfectly similar, both in form and size, to the preceding; and the latter, like all the others, is neither dilated nor canaliculated above. In

Calcar, Dej.—*Trogosita*, Fab.

The thorax forms a long square, the body is linear, of equal width throughout, the anterior border of the head is emarginated, and the three last penultimate joints of the antennæ are almost globular, and not sensibly transversal(3).

Upis, Fab.

The thorax as in Calcar; the body narrow, but not linear; anterior edge of the head straight and unemarginate; penultimate joints of the antennæ lenticular and transversal(4). The

Tenebrio, Lin. Fab.

Or Tenebrio properly so styled, only differs from Upis in the thorax, which is more broad than long.

T. molitor, L.; Oliv., Col., III, 57, 1, 12. Length seven lines; brown, verging on a black, above; maronne and glossy beneath; thorax as wide as the elytra; square, and with two posterior impressions; elytra striate and punctured.—Very common, in the evening, in the less inhabited parts of houses, flour mills, bake-houses, on old walls, &c.

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(1) *Toxicum richesianum*, Lat., Gener. Crust. et Insect., II, p. 168, and I, ix, 9. I have seen another species in the cabinet of M. Labillardière, which from its appearance seems to be closely allied to Opatrum.

(2) *Boros corticalis*, Gyll., Insect. Suec. I, ii, p. 584; *Hypophlæus boros*, Fab.;—*B. thoracicus*, Gyll., Ib., p. 586.

(3) *Trogosita calcar*, Fab.

(4) *Upis ceramboides*, Fab.;—*U. saperdoides*, Bosc.

Its larva is long, cylindrical, of an ochreous yellow colour, scaly, and very smooth. It lives in bran and flour, and is given to the Nightingales. It becomes a chrysalis in the midst of the substance on which it has fed.

T. grandis, which is found in Brazil, under the bark of old trees, darts a caustic liquid from its anus to the distance of more than a foot. Other but smaller species from the same country completely cover themselves with this material. For these observations I am indebted to M. de la Cordaire(1).

There, the penultimate joint of the tarsi is very small, in the form of a little knot, and received into a longitudinal groove in the preceding, which is more dilated than the preceding ones, and almost cordiform.

The anterior edge of the head presents an emargination occupied by a portion of the labrum.

HETEROTARSUS, Lat.

A subgenus founded on an Insect from Senegal, having all the characters of a Tenebrio, but with singular tarsi. At the first glance, the two anterior ones appear to consist of but four joints, and the two others, of three.

FAMILY II.

TAXICORNES.

In this second family of the heteromerous Coleoptera, we find no small corneous tooth on the inner side of the maxillæ. All these Insects are winged, their body is most commonly square, their thorax trapezoidal or semicircular, and concealing or receiving the head. The antennæ, usually inserted under a marginal projection of the sides of the head, are short, more or less perfoliate or granose, enlarge insensibly, or terminate in a club. The legs are only adapted for walking, and all the joints of the tarsi are entire, and terminated by single hooks; the anterior tibiæ are frequently broad and triangular. Several males have the head furnished with horns. Most of them inhabit the fungi on trees, or under the bark; some live on the ground, under stones.

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(1) For the other species, see Catalogue, &c., Dej., and Fabricius. This genus, however, as now composed needs depuration; several of its species belong to Phaleria, or other subgenera. Some of them may even form new ones.

M. Leon Dufour has observed in certain subgenera of this family, such as Hypophlæus, Diaperis proper, Eledona or Boletophagus, an excrementitious apparatus, and in the second salivary vessels. The chylific ventricle of these Heteromera is bristled with little piliform papillæ. These characters, and the conformation of the organs of generation, point out the connexion between this and the preceding family(1).

In some, the head is completely exposed, and never entirely received into a deep notch in the anterior of the thorax. This last is sometimes trapezoidal or square, and at others almost cylindrical; its sides, as well as those of the elytra, do not extend remarkably beyond the body.

This division will form the tribe of the DIAPERIALES, the type of which is the genus

DIAPERIS.

Sometimes the antennæ are generally stout, almost straight, and mostly perfoliate, or terminated abruptly by a thick club. The body is smooth, or the elytra are lightly striated. The sides of the thorax have but a slight border, and are neither depressed nor dentated; there is no remarkable separation nor hiatus between its posterior angles and the base of the elytra. The two anterior legs are triangular, and dilated exteriorly at the extremity, in a great number.

Here the antennæ enlarge insensibly, or at least are not abruptly terminated by an oval or ovoid club, of which most of the joints are larger than the preceding ones.

In some, and the greater number, the body is oval or ovoid, sometimes even hemispherical, with the thorax either nearly square or trapezoidal, most frequently transversal, but never long and narrow.

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(1) It is the same with the following one. The transition from Tenebrio to Phaleria and Helops, is almost insensible, and consequently the characters of these families, in some cases, are ambiguous.

PHALERIA, Lat.—*Uloma, Phaleria*, Dej.

The last joint of the maxillary palpi larger and securiform, or like a reversed triangle; anterior tibiæ wider, dilated in the manner of a reversed triangle, and frequently dentated, or furnished with small spines on one of its sides(1). In

DIAPERIS, Geoff. Fab.

Or Diaperis properly so called, the maxillary palpi terminate in an almost cylindrical joint, hardly thicker than the penultimate; and the anterior tibiæ, hardly or not at all wider than the following ones, are narrow, almost linear, and slightly dilated at the extremity.

Among those species where the body is ovoid and convex, the thorax is lobate posteriorly, and the antennæ are thick and almost entirely perfoliate, comes the *D. boleti; Chrysomela boleti*, L., Oliv., Col., III, 55, 1, whose body is about three lines long, of a glossy black, with three fulvous-yellow, transverse and dentated bands on the elytra.—In the fungi of trees.

Another more elongated species, placed among the Ips by Fabricius—*hæmorrhoidalis*—forms the genus *Neomida* of Ziegler. The head of the male is armed with two horns(2).

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(1) Some by their elongated form approach Tenebrio. The intermediate joints of the antennæ are almost obconical, and the four last compose a perfoliate club. The head of the males is horned. M. Dalmar has figured a species of this division—*Phaleria furcifera*, Analect. Entom., IV. M. Fischer—Entomog. Imp. Russ., II, xxii, 3—has figured another. The Trogositæ *taurus, quadricornis, vacca* of Fabricius belong to this division.

Others have the body oval and depressed; and the antennæ very perfoliate—such are the Tenebriones *culinaris, retusus, chrysomelinus, impressus, nitidulus* of that author.

The species of these two divisions form the genus *Uloma*, Meg. and Dej. Those, in which the body is shorter and more rounded, in the form of a short ellipsis, or even hemispherical, and in which the six or seven last joints of the antennæ are almost globular, constitute the *Phaleria*, Dej. The *Tenebrio cadaverinus*, Fab., is of this number.

A species—*bicolor*—from the Cape of Good Hope, belonging to this division, is distinguished from the preceding ones by the maxillary palpi, which are terminated by a proportionally larger securiform joint, and by its antennæ, of which the four last joints are alone globular.

Another—*peltoides*—approaches Peltis and Cossyphus, Fab., in its flattened form. Its antennæ are hardly perfoliate; most of the joints, and even the last, being in the form of a reversed cone.

(2) The Trogositæ *cornuta*, and *maxillosa* of Fabricius, on account of the difference in the mandibles presented in the two sexes, might be formed into a sepa-

Some others, but in which the five last joints are alone perfoliate and form a little club, also constitute a separate genus, that of *Pentaphyllus*(1).

Other Insects of this tribe, whose antennæ gradually enlarge and are almost entirely perfoliate, are distinguished from Diaperis and Phaleria by the linear form of their body, and their thorax, which forms a long square or is almost cylindrical. They are the

Hypophlæus, Fab.—*Ips*, Oliv.

They are found under the bark of trees(2).

There, the antennæ, exposed at base or but very slightly covered, are abruptly terminated by a large oval or ovoid perfoliate club, of at least four joints, the second of which, in those where it consists of five, is very small. The body is ovoid, or almost hemispherical, and convex. In

Trachyscelis, Lat. Dej.

The antennæ, hardly longer than the head, terminate in an ovoid club of six joints; all the tibiæ are broad, triangular, and fitted for digging, and the body short and most usually hemispherical. They bury themselves in the sand on the sea shore(3).

Leiodes, Lat.—*Anisotoma*, Illig. Fab.

The body similarly short and convex; but the antennæ, as long as the head and thorax, are terminated by an oval club of five joints, the second of which is smaller. The tibiæ are narrow, elongated or but slightly dilated; the four anterior ones, at least, are spinous(4).

Tetratoma, Herbst. Fab.

The body somewhat more elongated than that of the preceding Insects, ovoid, less elevated above; all the tibiæ narrow and without

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rate subgenus. The *T. ferruginea*, Fab., also appears to constitute another by its antennæ, which abruptly terminate in a perfoliate club of three joints, the preceding ones being very small and granose.

(1) See Catalogue, &c., Dej., and Dahl., and for the other species, Fabricius, Olivier, and Gyllenhal.

(2) *Hypophlæus castaneus*, Fab.; Panz., Faun. Insect. Germ., XII, 13;—*H. linearis*, Fab.; Panz., Ib., VI, 16;—*H. fasciatus*, Panz., Ib., VI, 17;—*H. bicolor*, Fab.; Panz., Ib., XII, 14;—*H. pini*, Ib., LXVII, 19. In Hypophlæus and Eledona, M. Leon Dufour found but four biliary vessels; in Diaperis there are six.

(3) Lat., Gener. Crust. et Insect. IV, p. 379.

(4) Lat., Ibid., II, p. 180;—the Anistomæ *humerale*, *axillare*, *castaneum*, *orbiculare*, *piseum*, *ferrugineum* of Gyll., Insect. Suec., I, ii, p. 180, and I, et seq.

spines; the antennæ as long as the head and thorax, and terminated by an oval club of four joints(1).

Sometimes the antennæ, always terminated by a perfoliaceous club of five or three joints, the preceding ones of which are almost in the form of a reversed cone, or slightly dilated on the outer side in the manner of a tooth, are arcuated, or somewhat curved. The body is ovoid, very unequal above, or the elytra are deeply punctured and striated. The thorax is depressed laterally, and the edges of this marginal border are dentated; it is separated posteriorly on each side by a remarkable hiatus. The palpi are filiform, or slightly enlarged at the extremity, as in Phaleria and Diaperis. The head of the males is frequently horned. They are also found in the fungi on trees: they form the genus

ELEDONA, Lat.—*Boletophagus*, Fab., and most others.

M. Ziegler and Count Dejean only refer to it those species in which the club of the antennæ is formed by the last five joints, and the preceding ones are slightly securiform(2).

Those, in which the three last alone form the club, and the three preceding ones, are in the form of reversed cones, without an interior projection, compose the genus COXELUS(3).

Our second tribe of the Taxicornes, the COSSYPHENES, consists of Insects analogous in form to the *Peltis* of Fabricius, and to several Nitidulæ and Cassidæ: it is ovoid or sub-hemispherical, and overlapped in its contour by the dilated or flattened sides of the thorax and elytra; the head is sometimes entirely concealed under that thorax, and at others received into an anterior emargination of the same part. The last joint of the maxillary palpi is larger than the preceding ones, and securiform.

This tribe is composed of the genus

COSSYPHUS, Oliv. Fab.

Some of them have a flat body, of a solid consistence, in the form of a shield, and antennæ terminated by a club composed of four or five joints; they are peculiar to the eastern continent and to New Holland. Such are those which form the

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(1) Lat., Gener. Crust. et Insect., II, p. 180, and I, ix, 10. See Fab. and Gyllenhal.

(2) See the Catalogue, &c., Dej., p. 68; but refer my *Eledona spinosula* to the genus Coxelus.

(3) Catalogue, &c., Dej., p. 67. The Cis, in a natural order, seem to approach these Insects.

Cossyphus, Oliv. Fab.

Or Cossyphus properly so called, where the almost semicircular thorax presents no anterior emargination, and entirely conceals the head; where the antennæ are short, and terminate abruptly in an oval mass of four joints, most of which are transversal; the second of the whole number and the following ones are almost identical.

These Insects inhabit the East Indies, southern part of Europe, and north of Africa(1). In

Helæus, Lat. Kirb.

The head is received into a deep emargination or median aperture of the thorax, and is exposed at least superiorly. The antennæ, at least as long as these two parts of the body taken together, terminate almost gradually in a narrow, elongated club, formed by the last five joints, the last of which is ovoid, and the preceding ones turbiniform; the second of the whole number is shorter than the third.—They are peculiar to New Holland(2).

The others, where the head is always exposed and simply received into a deep notch in the thorax, have a convex, soft or but slightly solid, almost hemispherical body, and granose antennæ, nearly equal throughout. They are peculiar to South America, and at a first glance resemble Coccinellæ and various species of Erytoli. Such are those which form the

Nilio, Lat.(3)

FAMILY III.

STENELYTRA.

The third family of heteromerous Coleoptera only differs from the second in the antennæ, which are neither granose nor perfoliate, and whose extremity, in the greater number, is not thickened. The body is most frequently oblong, and arcuated above, and the legs are elongated as in many other Insects. With the exception of their antennæ and size, the males resemble the females. These Heteromera are usually much more agile than the preceding ones; several conceal themselves under the bark of old trees, while most of the others are found on leaves and flowers. Most of them were referred by Linnæus to his genus *Tenebrio;* he distributed the remainder in *Necydalis*, *Chrysomela*, *Cerambyx* and *Cantharis*. In the first edition of this work, we united these Insects in the single genus HELOPS, but their internal as well as external anatomy proves that we may divide them into five tribes, attached to as many genera, viz. Helops, Cistela, Dircæa, Fab., and the Œdemera and Mycterus of Olivier. With respect to the biliary vessels, which have a cæcal insertion, or the posterior ones, we learn from M. Dufour, that this insertion is not effected in the two last genera as in the first and other preceding heteromera, by a common trunk, but by three canals, one of which is simple, the second bifid, and the third trifid. In the Œdemeræ he found salivary vessels. Their head is more or less narrowed and prolonged anteriorly in the form of a snout, and the penultimate joint of the tarsi is always bilobate; characters which seem to approximate these Insects to the Rynchophora. With respect to the alimentary canal, and several other considerations, Helops and Cistela approach Tenebrio, but the Cistelæ have a smooth chylific ventricle, entire mandibles, and usually live on flowers or leaves, by which they are distinguished from Helops. Most of the Dircææ have the faculty of leaping, and the penultimate joint of their tarsi, or at least of some, is bifid; some of them inhabit mushrooms, others old wood.

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(1) Lat., Gener. Crust. et Insect., II, p. 4.

(2) Cuv. Règn. Anim., III, p. 301, IV, xiii, 6;—*Helæus Brownii*, Kirb., Lin. Trans., XII, xxiii, 8.

(3) Lat., Gener. Crust. et Insect., II, p. 198, and I, x, 2; *Ægithus marginatus*, Fab. See Germ., Insect. Spec. Nov., p. 162.

The genera *Eustrophus* and *Orchesia* which we formerly placed in this family now belong to the next.

These Insects are connected on the one hand with the Helopii, and on the other with the Œdemeræ, and still more closely with Nothus, a subgenus of the same tribe: such are the principles which have guided us in the division of this family.

In some, the antennæ are approximated to the eyes, and the head is not prolonged in the manner of a proboscis, but terminated at most by a very short snout. They will form our four first tribes.

Those of the first or the HELOPII, have their antennæ covered at base by the margin of the head; they are generally filiform or slightly thickened towards the extremity, generally composed of almost cylindrical joints attenuated at base, of which the penultimate ones are frequently a little shorter, and in the form of a reversed cone, and the last is usually almost ovoid; the third is always elongated. The extremity of the mandibles is bifid; the last joint of the maxillary palpi is larger and securiform, or in the figure of a reversed triangle; the eyes are oblong, and reniform or emarginated. None of the legs are fitted for leaping; the penultimate joint of the tarsi, or at least of the last ones, is almost always entire or not deeply emarginate; their terminal hooks are simple, or without fissure or dentation; the body is most commonly arcuated above, and always solid and firm.

Such of the larvæ as are known to us are smooth, filiform and glossy, with very short legs, like that of a Tenebrio. They are found in old wood, and the perfect Insect lives under the bark of trees.

This tribe mostly corresponds to the genus

HELOPS, Fab.

In some, the body is almost elliptical, strongly arcuated above, or very convex; the antennæ, at most, as long as the thorax, compressed, and dilated like the teeth of a saw towards the extremity; the thorax is transversal, plane above, either trapezoidal and becoming widened posteriorly, or almost square; and the elytra frequently terminate in a point or by a tooth. The posterior extremity of the præsternum projects in a little point, which is received into a forked emargination of the mesosternum.

In these the mentum is broad, and conceals the origin of the maxillæ. The middle of the posterior extremity of the thorax projects along the side of the scutellum in the manner of an angle. Such is the

EPITRAGUS, Lat.(1)

In the others the mentum does not cover the base of the maxillæ, and the posterior margin of the thorax is straight, or but slightly dilated behind.

CNODALON, Lat.

Where, from the fifth joint, the antennæ are strongly compressed and serrated, and where the head is much narrower than the thorax(2).

CAMPSIA, Lepel. and Serv.—*Camaria*, Id.

Where the antennæ, from the sixth joint, are slightly serrated, and the head is as wide as the posterior margin of the thorax. The body is proportionally longer and less convex, and the thorax wider posteriorly(3).

In all the other Helopii, the mesosternum presents no remarkable emargination, and the posterior extremity of the præsternum is not extended into a point.

Here the body is sometimes ovoid or oval, and at others more oblong but narrowed at both ends; it is never cylindrical or linear, nor much flattened. Certain subgenera have been formed with Helopii, which approach the first in their strongly inflated body, which is gibbous posteriorly.

Those, in which the body is almost ovoid or short, and the thorax transversal, plane or simply curved, compose the following subgenera.

SPHENISCUS, Kirby.

Easily mistaken at the first glance for Erotylus, and in which, as in the preceding subgenera, the inner side of the last joints of the antennæ are dilated like the teeth of a saw, and the thorax is plane(1).

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(1) Lat., Gener. Crust. et Insect., II, p. 183, and I, x, 1. The maxillæ are unguiculated like those of Melasoma. This subgenus, and the two following subgenera are peculiar to South America.

(2) Lat., Gener. Crust. et Insect., II, p. 182, and I, x, 7.

(3) Encyc. Méthod., article *Sphenisque*. Messrs Lepeletier and Serville give but ten joints to the antennæ of the *Camariæ*, a character which would distinguish them from the other Helopii: but we have distinctly seen eleven in various Helopii from Brazil, which appear to us closely allied to the *C. nitida*, quoted by them. Until we can verify this anomaly in the individuals examined by those gentlemen, we think it best to unite the two subgenera. Besides the *Cnodalon irroratum* of Germar, quoted in this article, refer the *Toxicum geniculatum* and *nigripes*, ejusd., to the same subgenus.

Acanthopus, Meg. Dej.

Shorter and rounder than the Insects of the preceding subgenus, with simple antennæ terminated by a larger and ovoid joint; the anterior thighs inflated and dentated, at least in one of the sexes, and the tibiæ almost linear with very short spurs, or almost none; anterior tibiæ arcuated(2).

Amarygmus, Dalm.—*Cnodalon*, *Helops*, *Chrysomela*, Fab.

Allied to Acanthopus, with simple but filiform antennæ, and the anterior thighs neither inflated nor dentated. All the tibiæ are straight and terminated by very apparent spurs(3).

Those, in which the thorax is inflated above, ovoid and truncated at both ends, narrower throughout than the abdomen, with simple antennæ enlarging towards the extremity, and all the tibiæ narrow, long, and curved or arcuated, form the

Sphærotus, Kirby(4).

The same naturalist comprises under the generic appellation of

Adelium, Kirb.—*Calosoma*, Fab.,

Helopii, of an oval form, with the thorax wider than it is long, almost orbicular, emarginated before, truncated behind, dilated and arcuated laterally, and with almost filiform antennæ, of which most of the joints are in the form of a reversed cone. They more particularly inhabit New Holland(5).

Those species, in which the body forms an oblong oval, insensibly arcuated and convex, or almost straight above, with simple antennæ, either filiform, or somewhat larger towards the extremity, particularly in the females, and the thorax is almost square, or in the form of an elongated heart, truncated posteriorly, form two other subgenera(1). In

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(1) *Spheniscus erytoloides*, Kirb., Lin. Trans., XII, xxii, 4; Encyc. Méthod., article *Sphenisque*. The Helopii *suturalis* and *geniculatus* of Germar form the passage from this subgenus to Helops proper.

(2) *Helops dentipes*, Panz., Ross.;—*Helops dentipes*, Fab., another species, but from the East Indies.

(3) Dalm., Anal. Entom., p. 60. The *Helops ater*, Fab., should also be referred to this subgenus.

(4) *Sphærotus curvipes*, Kirb., Lin. Trans., XXI, 15.

(5) *Adelium calasomoides*, Kirb., Ibid., XII, xxii, 2.

Helops, Fab.

Or Helops properly so styled, most of the joints of the antennæ are almost obconical or cylindrical, and attenuated at base. The thorax is transversal, or hardly as long as it is wide, either square or trapezoidal, or cordiform, abruptly narrowed posteriorly, terminated by pointed angles, and always exactly applied to the base of the elytra(2).

Læna, Meg., Dej.—*Helops*, Fab.—*Scaurus*, Sturm.

The antennæ generally composed, at least in the females, of short turbiniform joints, the last of which is thicker than the preceding ones and ovoid. The thorax is almost in the form of a truncated heart, elevated or convex above, separated from the abdomen by a considerable hiatus, and with the angles obtuse or rounded. The thighs, particularly the anterior ones, are inflated(3).

The last Helopii have the body elongated, narrow, almost of the same width throughout(4), and either thick and almost cylindrical, or much depressed. The thorax is nearly square, or almost in the form of a truncated heart.

Those, in which the body is tolerably thick, almost cylindrical or linear, with the thorax nearly square, and not narrowed posteriorly, form two subgenera.

Stenotrachelus.—*Dryops*, Payk.

Where the head is elongated, and narrowed posteriorly almost in the manner of a neck; the antennæ are abruptly terminated by three joints, shorter and somewhat thicker than the rest; the third is much longer than the following ones(5).

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(1) The two or four anterior tarsi are dilated and pilose beneath in several males.

(2) The *Helops cœruleus, lanipes, caraboides*, Fab.; the *Helops arboleus, gracilis*, of Fischer—Entom. Russ., II, xxii, 4, 5—and several other species foreign to France. I also refer to it the *Catops flavipes* of the first, which, as well as his Helops obliquatus, seems to form the transition from Amarygmus to the *H. caraboides*.

(3) *Læna pimelia*, Dej., Catal.; *Helops pimelia*, Fab.; *Scaurus viennensis*, Sturm; *Læna pulchella*, Fisch., Entomog. Imp. Russ., II, xxii, 8; var.?

(4) Rather narrower before.

(5) *Dryops ænea*, Payk.; *Calopus æneus*, Gyll.; *Œdemera ænea*, Oliv. The *Agnathus decoratus* of Germar—Faun. Insect. Europ., fascic. XII, fig. 4—a speci-

STRONGYLIUM, Kirb.—*Stenochia*, ejusd.—*Helops*, Fab.

Where the head is neither elongated nor narrowed posteriorly, and the last joints of the antennæ—somewhat more dilated—do not suddenly differ from the preceding ones; the third is merely somewhat longer than the following one(1).

Those, in which the body is flattened, and the thorax narrowed posteriorly almost in the form of a truncated heart, compose the last subgenus, that of

PYTHO, Lat. Fab.

Where the antennæ hardly enlarge towards the extremity or are filiform, with the last joint almost conical; the third is hardly longer than the preceding and following ones.

Certain species peculiar to Brazil closely approach Pytho; but the second joint is much shorter than the third, and the angles of the thorax are acute, instead of being rounded or obtuse as in that genus(2).

The second tribe, that of the CISTELIDES, is very closely allied indeed to the first, but the insertion of the antennæ is not covered, the mandibles terminate in an entire or unemarginate point and the hooks of the tarsi are pectinated inferiorly. Several of these Insects live on flowers. The digestive canal is shorter than in Helops, and the chylific ventricle presents no papillæ.

This tribe forms the genus

CISTELA, Fab.

In some, all the joints of the tarsi are entire. The last of the max-

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men of which I found near Brives, appears to me to approximate closely to the Stenotracheles. The *Pelmatopis Hummelii*, Fisch.—Entom. Imp. Russ., II, xxii, 7—is, I presume, congeneric and closely approaches the first species.

N.B. *Pelmatopus*. M. Fischer, who at first thus designated this genus in his plates, has, in the text, adopted the name of SCOTODES, previously given to it by M. Eschscholtz.

(1) *Strongylium chalconatum*, Kirb., Lin. Trans., XII, xxi, 16;—*Stenochia rufipes*, Ib., xxii, 5. See also the *Helops splendidus*, *aurichalceus*, *azureus*, *interstitialis*, *flavicrus*, *luteicornis*, *limbatus*, of Germar.

(2) See Fab., System. Eleuth., II, p. 95; Lat. Gener. Crust. et Insect., II, p. 195; Schœnh., Synon. Insect., I, iii, p. 55; Frisch., Entom. Imp. Russ., II, xxii, 1.

illary palpi is merely somewhat larger, and obconical or triangular.

Here the thorax is thick, narrower than the abdomen, and almost orbicular or nearly cordiform. The antennæ thicker at the extremity and the thighs clavate.

Lystronichus, Lat.(1)

There the thorax is depressed, trapezoidal, and its posterior margin is as wide as the abdomen, or hardly narrower. The antennæ are filiform or slightly enlarged towards the extremity. In

Cistela, Fab.

Or Cistela properly so called, the head projects in the manner of a snout, and the labrum is hardly wider than it is long; most of the joints of the antennæ either obconical, triangular, or even serrated; the last is always oblong. The body is ovoid or bordering on an oval.

C. ceramboides; Chrysomela ceramboides, L.; Oliv., Col. III, 54, 1, 4. This species, on account of its antennæ, of which the three first joints are shorter than the following ones, and of the serrated form of the latter, might constitute a separate subgenus. It is five lines in length; black; elytra reddish and striated; thorax almost semicircular. The larva inhabits the tan of old Oaks, where it undergoes its metamorphosis.

C. sulphurea; Chrysomela sulphurea, L.; Oliv., Ib., I, 6. A more elongated form than that of the ceramboides; length four lines; lemon-yellow; eyes black; elytra striate; antennæ simple. Very common on different flowers, those of the Yarrow particularly(2).

Mycetochares, Lat—*Mycetophila*, Gyll. Dej.—*Cistela*, Fab.

Where the head does not project in the manner of a snout; where the labrum is very short, transversal and linear, and where most of the joints of the antennæ are short and nearly turbiniform; the last is ovoid. The body, particularly in the males, is narrow and elongated. The maxillæ and the labium are soft(3).

In the others, the penultimate joint of the tarsi is bilobate, and the last of the maxillary palpi strongly dilated and securiform. The body is generally more oblong. They form the

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(1) *Helops equestris*, Fab., and some others from Brazil;—*Helops columbianus*, Germ.;—*Notoxus helvolus*, Dalm.

(2) See Lat., Gener. Crust. et Insect., II, p. 225; Oliv., Col., Ib.; Schœnh., Synon. Insect. I, ii, p. 332, et seq.

(3) See Gyllenh., Insect. Suec., I, ii, p. 451; Lat., Gener. Crust. et Insect., II, p. 189, *Helops barbatus*. The name of *Mycetophila* having been employed by M. Meigen, I have thought it necessary to give a substitute in *Mycetochares*.

ALLECULA, Fab.(1)

The third tribe, that of the SERROPALPIDES(2), is remarkable, as intimated by its name, for the maxillary palpi, which are frequently serrated, very large, and inclined. The antennæ are inserted in an emargination of the eyes, exposed, as in the preceding tribe, and most usually short and filiform. The mandibles are emarginated or bifid at the extremity, and the hooks of the tarsi are simple. The body is almost cylindrical in some, and oval in others; the head is inclined, and the thorax trapezoidal. The anterior extremity of the head does not project, and the posterior thighs not inflated, characters which distinguish these Insects from various Heteromera of the ensuing tribe. The penultimate joint of the tarsi, or at least of the four anterior ones, is most commonly bilobate, and in those where it is entire, the posterior legs at least are fitted for leaping; in this case they are long and compressed, the tarsi small, almost setaceous, and their first joint elongated; the anterior ones are frequently short and dilated.

The type of this tribe is the genus

DIRCÆA, Fab.

Some few have their antennæ terminated by a club. Such are those which constitute the

ORCHESIA, Lat.—*Dircæa*, Fab.

Where the maxillary palpi are terminated by a securiform joint. The legs are fitted for leaping, and the penultimate joint of the four anterior tarsi is bifid(3).

The antennæ of the others are filiform.

Here the legs are fitted for leaping, the body is oval or ovoid, the antennæ are always short and almost cylindrical, the maxillary palpi merely somewhat larger at the extremity, but not terminated by a securiform joint, and all those of the tarsi entire.

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(1) The Alleculæ *contracta*, *geniculata* of Germar,—Insect. Spec. Nov., p. 163, 164—have their anterior tarsi strongly dilated.

(2) The *Securipalpes* of my Fam. Nat. du Règne Animal. The term *Serropalpides* is preferable, inasmuch as it reminds us of the genus *Serropalpus* which forms part of this tribe.

(3) Lat., Gener. Crust. et Insect., II, p. 194; Schœnh., Synon. Insect., I, iii, p. 51.

EUSTROPHUS, Illig.—*Mycetophagus*, Fab.

The body is ovoid and the thorax broad, emarginated before, and with prolonged posterior angles; the antennæ are shorter than the thorax, and the four posterior tibiæ elongated and terminated by two long spurs(1).

HALLOMENUS, Payk.—*Dircæa*, Fab.

The body more elongated, oval; antennæ longer than the thorax, and the posterior tibiæ long and slender, with two very short terminal spurs(2).

There the body is usually narrow and elongated, the maxillary palpi are terminated by a securiform joint, and the penultimate joint of the tarsi, or at least of the four anterior ones, is bilobate.

Sometimes the antennæ are thick and composed of short obconical or turbiniform joints.

In some, as in the two following subgenera, the body is oval, and the thorax transversal or almost isometrical, and becomes widened from before posteriorly.

DIRCÆA, Fab.—*Xylita*, Payk.

Or Dircæa properly so called, where the maxillary palpi are not serrated, and their last joint projects more on the inner side than the preceding ones. The thorax is insensibly lowered on the side. The scutellum is very small(3).

MELANDRYA, Fab.

Where the maxillary palpi are evidently serrated, the extremity of the second and third joint being prolonged into a point, and on a level with the fourth or the last. The thorax is abruptly depressed laterally, near its posterior angles, and the posterior margin is sinuous. The scutellum is of an ordinary size(4).

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(1) *Mycetophagus dermestoides*, Fab. Another species has been brought from Brazil by M. de la Cordaire.

(2) See Gyllenh., Insect. Suec., I, ii, p. 526.

(3) Gyll., Insect. Suec., I, p. 516, minus the species which he calls the *bifasciata*, *quercina*—see HYPULUS, and *fuscula*—see SCRAPTIA.

(4) Gyll., Insect. Suec., I, ii, p. 533, with the exception of the *M. ruficollis*—*Dircæa ruficollis*, Fab.—which it appears to me should be referred to the subgenus Conopalpus.

In the following subgenus, the body is narrow and almost linear. The thorax forms a long square, narrowed posteriorly.

Hypulus, Payk.—*Dircæa*, Fab.

The antennæ longer than in the preceding subgenus, slightly perfoliate and more separate; the three last joints of the maxillary palpi forming, together, an oval club(1).

Sometimes the antennæ are slender, and composed of elongated and almost cylindrical joints; the body is long and narrow, and the abdomen elongated.

Serropalpus, Hellw. Payk.—*Dircæa*, Fab.

Where the body is firm, the maxillary palpi are strongly serrated, the thorax is at least as long as it is wide, and the four posterior tarsi are long; all the joints of the two last are entire or without any apparent incisures(2).

Conopalpus, Gyll.

Where the body is soft, the maxillary palpi are but slightly serrated, the thorax is transversal, and the tarsi moderately elongated; the penultimate joint of the whole number is bilobate(3).

The fourth tribe, that of the Œdemerites, is connected with the third by several characters, such as having the antennæ inserted near the eyes, and their origin exposed, the mandibles bifid at the end, the penultimate joint of the tarsi bilobate, and the maxillary palpi terminated by a larger and securiform joint; but if we except the Nothi, approximated by the form and breadth of the thorax, and by some other characters to certain Heteromera of the preceding tribe, and yet distinguished from them by their strongly inflated posterior thighs, and their bicleft tarsial hooks, the Œdemerites present a union of characters which will not allow us to confound them with the other Heteromera. The body is elongated, narrow, almost linear, and the head and thorax are somewhat narrower than the abdomen. The antennæ are longer than the two latter, serrated in some—*Calopus*—filiform or setaceous, and composed of long and almost cylindrical joints in the others; the anterior extremity of the head is more or less prolonged into a little snout, and somewhat narrowed behind; the eyes are proportionally more elevated than in the preceding Heteromera. The thorax is at least as long as it is broad, almost square, or nearly cylindrical, and slightly narrowed behind; the elytra are linear or subulate posteriorly, and frequently flexible. These Insects are allied to Telephorus and Zonitis.

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(1) *Dircæa bifasciata*, Gyll., Insect. Suec., I, ii, p. 522;—ejusd., *D. quercina*, Ib., p. 523.

(2) Gyll., Insect. Suec., I, ii, p. 514; Lat., Gener. Crust. et Insect., II, p. 192, and I, ix, 12.

(3) Gyll., Ib., p. 547; Dejean, Catal., p. 70.

M. Leon Dufour has discovered in the Œdemerites two very simple, flexuous, and floating salivary vessels(1), as well as a paunch formed by a lateral crop, furnished with a neck or pedicle. They are the only Coleoptera in which he has observed it. These Insects are found on flowers or trees. Their metamorphoses are unknown.

These Heteromera will be comprised in a single genus, the

Œdemera, Oliv.

Here, where the antennæ are always short, inserted into an emargination of the eyes, and simple, the posterior thighs are inflated, at least in one of the sexes, the thorax is as wide as the base of the abdomen, and wider than the head; the hooks of the tarsi are bifid.

Nothus, Ziegl. Oliv.—*Osphya*, Illig.—*Dryops*, Schœnh.

Where the maxillary palpi are terminated by a large, securiform and elongated joint. The posterior legs are very stout in one of the sexes, with one stout tooth and two small spurs beneath, near the inner extremity of their tibiæ. The head is not prolonged anteriorly(1).

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(1) The Mordellones present the same character. In a more natural series it would perhaps be necessary to place the Horiæ, which also have the posterior thighs inflated, immediately after Zonitis and Sitaris, then pass to the Œdemerites and Mordellones, and terminate the Heteromera with the Notoxi or *Anthicus* of Fabricius, Insects evidently connected with the Mordellones by the Scraptiæ. In my Gener. Crust. et Insect., I have placed the Œdemerites at the end of the same section. The Rhæbi of M. Fischer, although tetramerous, are allied in many respects to the Nothi and Œdemeræ. The Xylophili, also tetramerous, are however closely related to the Notoxi.

In a natural order this would perhaps be the place for the *Rhæbus* of M. Fischer(2).

In the others, where the antennæ are always longer than the head and thorax, and where the legs are most commonly of the same thickness, the thorax is narrower than the base of the abdomen and somewhat narrowed behind, and the hooks of the tarsi are entire.

Calopus, Fab.—*Cerambyx*, De Geer.

Where the posterior legs, in both sexes, are the size of the others, or nearly so, and where the serrated antennæ are inserted into an emargination of the eyes, with the second joint much shorter than the third, in the form of a knot and transversal(3).

Sparedrus, Meg. Dej.—*Pedilus ?*, Fisch.

Similar to Calopus in the legs and insertion of the antennæ; but these latter organs are simple, with their second joint obconical like the third, and at least half as long(4).

Dytilus, Fisch.—*Helops*, *Dryops*, *Necydalis*, Fab.—*Œdemera*, Oliv.

Where the legs are also of the same thickness, or nearly so, in both sexes, but where the antennæ, always filiform, are inserted before the eyes. The elytra are not subulate or abruptly narrowed towards the extremity(5).

Œdemera, Oliv.—*Necydalis*, *Dryops*, Fab.

Where the posterior thighs are strongly inflated in one of the sexes, where the antennæ are usually long and smaller at the extremity, and the elytra suddenly narrowed near the end(6).

The fifth and last tribe of the Stenelytra, that of the Rhynchostoma, is composed of Insects, some of which, such as the first, are evidently related by the ensemble of their characters to the Œdemeræ, while the others, in a natural series, appear to belong to the family of the Rhynchophora. The head is considerably prolonged anteriorly in the form of an elongated snout or flattened proboscis, bearing the antennæ at its base and before the eyes, which are always entire or unemarginate. These Insects form a single genus, that of

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(1) Oliv., Encyc. Méthod., article *Nothus*. See Schœnh., Synon. Insect., I, iii, App., p. 8.

(2) See the family of the Rhynchophora.

(3) *Calopus serraticornis*, Fab.; Oliv., Col. IV, 72, 1, 1.

(4) *Calopus testaceus*, Schœnh., Synon. Insect., I, iii, p. 4—11;—*Pedilus fuscus*, Fisch., Entom. Imp. Russ., I, iv.

(5) *Dytilus helopioides*, Ib., I, v, 1;—*D. rufus*, Ib., 2, and the Œdemeræ with simple thighs of Olivier.

(6) The Œdemeræ of Olivier with inflated posterior thighs, and subulate elytra. cyc. Méthod., article *Œdémère*.

Mycterus.

Sometimes the antennæ are filiform and the snout is not widened at the end; the thorax is narrowed before in the form of a truncated cone or a trapezium; the ligula is emarginated, and the penultimate joint of the tarsi bilobate. They are found on flowers, a habit indicated by the silky prolongation of the terminal lobe of their maxillæ.

Stenostoma, Lat. Charp.—*Leptura*, Fab.

Where the body is narrow, and the thorax in the form of an elongated truncated cone; the elytra are flexible, narrow, elongated and contracted into a point; the antennæ are composed of long and cylindrical joints, and the maxillary palpi are terminated by an almost cylindrical joint, hardly thicker than the preceding ones(1).

Mycterus, Clairv. Oliv.—*Bruchus*, *Rhinomacer*, Fab.—*Mylabris*, Schœff.,

Or Mycterus properly so called, where the body is ovoid, solid, covered by a silky down, and the thorax trapeziform. The abdomen is square, long, rounded posteriorly; the antennæ are composed of joints, mostly obconical, the complete number of which seems to be twelve, the eleventh or last being abruptly narrowed and acuminated, and the maxillary palpi are terminated by a larger joint in the form of a reversed triangle(2).

Sometimes the antennæ are terminated by an elongated club formed by the last three to five joints; the snout is much flattened, with a salient angle on each side before the extremity; the thorax is in the form of a truncated heart, narrowed posteriorly; the ligula is entire, and so are all the joints of the tarsi.

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(1) *Œdemera rostrata*, Lat., Gener. Crust. et Insect., II, p. 229; *Stenostoma rostratum*, Charpent., Horæ Entom., IX, 8; *S. variegatum*, Ib., 6; *S. variegata*, Germ., Entom., Insect. Spec. Nov., p. 167.

(2) Lat., Gener. Crust. et Insect., ii, p. 230, genus *Rhinomacer*. See Olivier, Encyc. Méthod., article *Myctère*.

These Insects live under the bark of trees, and in a natural order seem to approach the Anthribus of Fabricius, who has confounded them. The body is depressed, the proboscis slightly pointed before, and the tarsi are short. The palpi are thickest at the extremity.

They form the subgenus

RHINOSIMUS, Lat. Oliv.—*Curculio*, Lin. De G.—*Anthribus*, Fab.

Designated by Illiger under the denomination of *Salpingus*. Some entomologists have adopted both, but restrict the latter generally to species in which the club of the antennæ is triarticulated, and applying the former, or Rhinosimus, to those in which the club is composed of four or five joints(1).

FAMILY IV.

TRACHELIDES.

In our second general division and fourth family of Heteromerous Coleoptera, the head is triangular or cordiform, and borne on a sort of neck or pedicle, abruptly formed, beyond which, being as wide at this point as the thorax, or wider, it cannot enter the cavity of the latter. The body is most commonly soft, the elytra are flexible, without striæ, sometimes very short, and a little inclined in others. The maxillæ are never unguiculated. The joints of the tarsi are frequently entire, and the hooks of the last bifid.

Most of the perfect Insects live on different plants, devour their leaves, or suck the nectar of their flowers. Many, when seized, curve their head and fold up their feet as if they were dead; the others are very active.

We will divide this family into six tribes, forming as many genera.

In the first, or that of the LAGRIARIÆ, the body is elongated and narrower before; the thorax either almost cylindrical or square, or ovoid and truncated; the antennæ, inserted near an emargination of the eyes, are simple, filiform, or insensibly enlarged towards the end, most frequently and at least partially granose, the last joint being longer than the preceding ones in the males; the palpi are thicker at the extremity, and the last joint of those of the maxillæ is larger, and in the form of a reversed triangle; the thighs border on an oval and are clavate; the tibiæ are elongated and narrow, the two anterior, at least, arcuated; the penultimate joint of the tarsi is bilobate, and the hooks of the last are neither incised nor dentated.

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(1) See Lat., Gener. Crust. et Insect., II, p. 231; Oliv., Col., and Encyc. [illegible]d.; Dej., Catalogue, &c., p. 77, and Gyll., Insect. Suec., I, ii, p. 640, and [illegible]

The species indigenous to France are found in woods, on various plants; their body is soft, their elytra are flexible, and like the Meloes, the Cantharides, when taken, counterfeit death.

This tribe is formed of the genus

Lagria, Fab.—*Chrysomela,* Lin.—*Cantharis,* Geoff.

Those species, in which the antennæ gradually enlarge, and are either wholly or partly almost granose, with the last joint ovoid or oval; in which the head projects but little before, and is prolonged and insensibly rounded behind; and where the thorax is almost cylindrical or square, compose our genus Lagria properly so called(1).

That, which I have named Statyra, consists of species, similar at a first glance to the Agræ, of the family of the carnivorous Pentamerous Coleoptera. Here the antennæ are filiform and composed of almost cylindrical joints, the last of which is very long and tapers to a point. The head projects anteriorly, and is strongly and abruptly narrowed behind the eyes. The thorax is longitudinal, oval and truncated at both ends. The sutural extremity of the elytra terminates in a tooth or spine(2).

We refer, with some hesitation, to the same tribe our genus Hemipeplus—Fam. Nat. du Règne Anim., p. 398—where the antennæ are filiform, almost granose, short and geniculate, with the second and third joints shorter than the following ones; where the body is linear and depressed; the head cordiform, somewhat wider posteriorly than the thorax; the eyes are entire and oval; the thorax forms a long square, slightly narrowed posteriorly; the elytra are truncated at the end and do not cover the posterior extremity of the abdomen. The maxillary palpi are salient, and terminated by a larger and triangular joint. The legs are short. This genus does not belong to the Tetramera, as I formerly thought, but to the Heteromera. The penultimate joint of the tarsi is bilobate. I have established this division on an Insect, found in Scotland in a shop, which was sent to me by Dr Leach.

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(1) See Fabricius, Olivier, Latreille and Schœnherr.

(2) See Encyc. Méthod., article *Statyre.*

The second tribe, that of the Pyrochroides, approaches the first in the tarsi and the anterior elongation and narrowing of the body, but it is flattened, and the thorax is almost orbicular or trapezoidal. The antennæ, at least in the males, are pectinated or plumous—*en panache;* the maxillary palpi are slightly serrated, and terminated by an elongated and almost securiform joint; the labial palpi are filiform; the abdomen is elongated, entirely covered by the elytra, and rounded at the extremity.

These Heteromera, which are found in the spring in woods, and whose larvæ live under the bark of trees, form the genus

Pyrochroa, Geoff. Fab. Dej.—*Lampyris*, Lin.

Those species, in which the antennæ are almost as long as the body in the males, and give off long bearded filaments; where the eyes, in the same sex, are large and approximated behind; where the thorax is in the form of a truncated cone, or is trapezoidal; and, finally, where the body is proportionally narrower and more elongated as well as the legs, constitute the genus

Dendroides, Lat.—*Pogonocerus*, Fisch.(1)

Those, in which the antennæ are simply pectinated and shorter, in which the eyes are remote from each other, and the thorax is almost orbicular and transversal, form the genus

Pyrochroa properly so called(2).

In the third tribe, that of the Mordellonæ, so far as respects the form of the joints of the tarsi and of their hooks, and of that of the antennæ and palpi, we find no common and constant character. These Insects, however, are easily distinguished from other Heteromera of the same family, by the general conformation of their body which is elevated and arcuated; the head is low, the thorax trapezoidal or semicircular, and the elytra are very short or narrowed, and terminate in a point, like the abdomen. Several of these Insects approach the Pyrochroides in their antennæ; others, by their maxillæ, the hooks of their tarsi and parasitical habits, approximate to Nemognathus and Sitaris, subgenera of the last tribe of this family; but they are removed both from the former and the latter, by their extreme agility and the firm and solid nature of their teguments.

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(1) I had established this genus on an Insect from Canada, which formed part of the collection of M. Bosc, that closely approximates to the *Pyrochroa flabellata*, Fab. M. Fischer has made the same generic section, under the denomination of Pogonocerus, from a second species—*thoracicus*—discovered in southern Russia. figure of it, given by him in the Mem. of the Nat. of Mosc., is reproduced in t volume of his Entomog. Imp. Russ.

ee Geoffroy, De Geer, Fabricius, Latreille, Schœnherr, &c.

They form the genus

MORDELLA, Lin.

In some, the palpi are almost of equal thickness throughout. The antennæ of the males are strongly pectinated, or flabelliform. The extremity of the mandibles is unemarginated. The joints of the tarsi are always entire, and the hooks of the last one are dentated or bifid. The middle of the posterior margin of the thorax is always strongly prolonged backwards, and simulates a scutellum. The eyes are not emarginated. The larvæ of some of these Insects —*Ripiphori*—inhabit the nests of certain Wasps.

RIPIPHORUS, Bosc. Fab.

Their wings are extended, reaching beyond the elytra, which are the length of the abdomen; the hooks of the tarsi are bifid; the antennæ, inserted near the inner edge of the eyes, are pectinated on both sides in the males, serrated, or with but a single range of short teeth in the females. The terminal lobe of the maxillæ is very long, linear, and salient, and the ligula equally elongated and strongly bifid.

Certain naturalists have found several living specimens of the *Ripiphorus paradoxus* in the nests of the Common Wasp, which led to the opinion, that they had lived there in their larvæ state. According to an observation of M. Farines, however, communicated to Count Dejean—Ann. des Sc. Nat., VIII, 244—the larva of the *R.*

bimaculatus lives in the root of the *Eryngium campestre*, where it also undergoes its metamorphosis(1).

MYODITES, Lat.—*Ripidius*, Thunb.—*Ripiphorus*, Oliv. Fab., &c.

Where the wings are also extended, but the elytra very short, in the form of a truncated scale, or very obtuse at the extremity. The hooks of the tarsi are indented beneath. The antennæ are inserted on the summit of the head, and strongly pectinated in both sexes—on the two sides and forming long filaments in the males, and on the inner side only in the females. The maxillæ are but slightly prolonged. The ligula is elongated and entire(2).

PELOCOTOMA, Fisch.—*Ripiphorus*, Payk, Gyll.

These Insects approach the Myodites in the serrated hooks of their tarsi; but their wings are covered by the elytra. The antennæ, inserted before the eyes, have but a single range of filaments or teeth in both sexes. The scutellum is very apparent. The maxillæ do not project, and the ligula is emarginated(3).

In the others, the wings are always covered by elytra extended almost to the extremity of the abdomen and tapering to a point. The posterior margin of the thorax is not lobate, or but very slightly so. The abdomen of the females terminates in the manner of a tail, pointed at the end. The eyes are sometimes emarginated. The maxillary palpi are terminated by a large joint, securiform, or like a reversed triangle. The extremity of the mandibles is emarginated or bifid. The antennæ, even in the males, are at most serrated. In

MORDELLA, Lin. Fab.

Or Mordella properly so called, the antennæ are of equal thickness throughout, and somewhat serrated in the males; all the joints of the tarsi are entire, and the hooks of the last present one or two indentations beneath. The eyes are not emarginated.

M. Leon Dufour has observed in the *Mordelle à bandes*, two floating salivary vessels longer than the body. The hepatic vessels have no cæcal insertion, an exceptive character in this section.

M. aculeata, L.; Oliv., Col., III, 64, 1, 2. Length two lines; black, glossy, immaculate, with a silky down; an ovipositor as long as the thorax, by means of which it introduces its ova into the cavities of old wood(4).

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(1) See the Nouv. Dict. d'Hist. Nat., Ed. II, article *Ripiphore*.

(2) Ibid., article *Myode*.

(3) Ibid., article *Pélocotome*; Fisch., Entom. Imp. Russ., II, xxxvii, 9. Several species are found in Brazil.

(4) Add the following species of Olivier: *fasciata*, *duodecim-punctata*, *octo-punc-*

ANASPIS, Geoff.—*Mordella*, Lin. Fab.

Distinguished from the preceding by the antennæ, which are simple, and gradually enlarge by the emargination of the eyes, and by the four anterior tarsi, of which the penultimate joint is bilobate. The hooks of the last are entire and without sensible indentations(1).

In the fourth tribe, that of the ANTHICIDES, we find the antennæ simple or slightly serrate, filiform; or a little thicker towards the extremity, most of the joints being nearly obconical and almost similar, with the exception of the last, (and sometimes also of the two preceding ones), which is somewhat larger and oval. The maxillary palpi are terminated by a securiform club; the penultimate joint of the tarsi is bilobate; the body is narrower before, and the eyes are entire or but slightly emarginated. The thorax is sometimes obovoid, narrowed and truncated posteriorly, sometimes divided into two knots, and at others semicircular. Some of these Insects are found on various plants, but the greater number live on the ground. They run with great quickness. Their larvæ are perhaps parasitical.

They will compose the genus

NOTOXUS, Geoff.

SORAPTIA, Lat.—*Serropalpus*, Illig.

Which, by the almost semicircular, transversal thorax, the filiform antennæ with almost cylindrical joints inserted in a little emargination of the eyes, are easily distinguished from all other Insects of this tribe. Their port is very analogous to that of the Mordellæ, Cistelæ, &c.(2)

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tata, *abdominalis*. See also Fisch., Entomog. Imp. Russ., II, xxxviii, fig. 3, 4. His genus *Ctenopus*—Ibid, tab. ead., fig. 1—appears to form the transition from the Pelocotomæ to the Mordellæ. The antennæ are simple; the labrum is bifid; the mandibles are strong and arcuated; the maxillary palpi are very long and almost filiform; all the joints of the tarsi are entire, and the hooks of the last are pectinated.

(1) Fischer, Ib.; *Anaspis frontalis*, tab. ead., f. 5;—*lateralis*, f. 6;—*thoracica*, f. 7;—*flava*, f. 8.

(2) Lat., Gener. Crust. et Insect., II, p. 195.

STEROPES, Stev.—*Blastanus*, Hoffm.

Where the antennæ are terminated by three cylindrical joints much longer than the preceding ones(1). In

NOTOXUS, Geoff. Oliv.—*Anthicus*, Payk. Fab.

Or Notoxus properly so called, where the antennæ enlarge insensibly and are almost entirely composed of obconical joints, and where the thorax is obovoid, narrowed and truncated posteriorly, or divided into two globular points.

> Some species, such as the *N. monoceros; Meloe monoceros*, L.; Oliv., Col., III, 51, 1, 2, have a projecting horn on the thorax. The body is two lines in length, of a light fulvous colour, with two points at the base of each elytron, and a transverse band curved towards the suture, black; the horn is dentated. Of those in which the thorax is destitute of a horn, some are apterous(2).

The two last tribes of this family and of the section of the Heteromera present certain common characters, such as mandibles terminating in a simple point; the palpi filiform, or merely slightly thickened towards the extremity, but never ending in a securiform club; the abdomen soft; the elytra flexible, and in most of them epispastic; all the joints of the tarsi, some few excepted, entire, and their hooks generally bifid. In a perfect state they are all herbivorous, but several, in their first state, or that of larvæ, are parasitical.

The HORIALES, composing the fifth tribe, differ from those which constitute the sixth, or the CANTHARIDIÆ, in their hooks, which are indented and accompanied (each) by a serrated appendage. These Insects have filiform antennæ, as long, at most, as the thorax, a small labrum, strong and salient mandibles, filiform palpi, square thorax, and very robust posterior legs, at least in one of the sexes.

The metamorphoses of the Spotted Horia, an Insect inhabiting the Antilles and South America, are described in the

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pius, Stev., Mem. Nat. Mosc., I, 166, x, 9, 10; Fisch., Entomog. 6; Schœnh., Synon. Insect., I, ii, 54.

l., and Encyc. Méthod.; Schœnh., Ibid. The *Odacantha tri-*s is a Notoxus.

fourteenth volume of the Transactions of the Linnean Society of London; its larva destroys that of a species of Xylocopa—*Teredo; X. morio*, Fab.—which perforates the dead trunks of trees, and deposits its ova there in the manner of other Xylocopæ. The author of the Memoir alluded to suspects that the larva of this coleopterous Insect lives on the provisions destined for the other, which consequently is starved to death.

This tribe is composed of the genus

HORIA, Fab.

These Insects inhabit the intra-tropical countries of South America and of the East Indies. One of these species, from the latter, is removed from all others by its head, which is narrower than the thorax, and by its posterior thighs which are strongly inflated, a character which perhaps only belongs to one of the sexes. It is the type of my genus *Cissites*(1).

The sixth and last tribe, that of the CANTHARIDIÆ, is distinguished from the preceding one by the hooks of the tarsi, which are deeply cleft, and seem to be double. The head is usually large, wider, and rounded posteriorly. The thorax is commonly narrowed behind, and approaches the form of a truncated heart; in others it is almost orbicular. The elytra are frequently somewhat inclined laterally, or tectiform, flattened, and rounded. These Insects simulate death when they are seized, and several, thus situated, produce a caustic yellowish liquid of a penetrating odour, from the articulations of their feet; the organs which secrete it have not yet been detected.

Various species—*Meloes*, *Mylabres*, *Cantharides*—are employed externally as epispastics, and internally as a powerful stimulant; the latter use of them however is extremely dangerous.

This tribe is formed of the genus

MELOE, Lin.

Which has been divided into several others. The anatomical observations of M. Leon Dufour, with the highly interesting experiments of Dr Bretonneau of Tours, on the vesicating property of the Insects of this tribe and of several other Coleoptera, enable us to arrange these generic sections in a natural order, which differs but little from that we had already adopted. The latter gentleman has ascertained that the Sitares do not possess the property in question, and the former found but four biliary vessels in the same Heteromera, instead of six which exist in the other Insects of this tribe. Independently of this, Sitaris resembles Zonitis in the whole ensemble of the organization, and these latter are contiguous to the Cantharides. These Insects thus occupying one of the extremities of this tribe, it is easy, by a comparative study of their other relations, to follow the series until we reach the opposite extremity—it accords with the progressive changes in the form of the antennæ.

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(1) See Lat., Gener. Crust. et Insect., II, p. 211; Fabricius, Schœnherr, Olivier, and the Transactions of the Linnean Society already quoted.

In some, those of both sexes consist of but nine joints, the last of which is very large and in the form of an ovoid head(1); those of the males, as well as their maxillary palpi, are very irregular. The body is depressed. Such is the

CEROCOMA, Geoff. Schæff. Fab.

These Insects make their appearance during the summer solstice, and frequently in great numbers in the same spot; they are found on flowers, particularly on those of the wild Chamomile, the Milfoil, &c.

C. Schæfferi; Meloe Schæfferi, L.; Oliv., Col., III, 48, i, 1. Green or bluish-green; antennæ and feet of a wax-yellow(2).

In all the others, the palpi are identical and regular in both sexes. The antennæ usually consist of eleven joints, and when there is one or two less, they always terminate regularly in a club. The body is tolerably thick and the elytra are somewhat inclined.

In these, the antennæ, always regular and granose in both sexes, sometimes appearing to be composed of nine or ten joints(3), and never longer than half the body, here, terminate in an arcuated club, or are evidently larger at the extremity, and there, from the second joint, form a short, cylindrical, or almost fusiform stem.

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(1) All the Insects of this tribe with clavate antennæ, or such as are larger near the end, are foreign to New Holland and America.

(2) See Lat., Gener. Crust. et Insect., II, p. 212; Olivier, Fabricius, Schœnherr, and Fischer, Entomog. Imp. Russ., II, xli, 1, 2, 3, 4.

(3) The two or three last ones appear to be confounded or intimately united, at least in the females; for the articulations of the club are more distinct in the males.

They form the genus *Mylabris* of Fabricius.

Those, in which the two or three last joints of the antennæ are united, at least in the females, and form an abrupt, thick, ovoid, or globuliform club, the extremity of which does not extend beyond the thorax, and in which the total number of joints in these organs is then but from nine to ten, form the subgenus

HYCLEUS, Lat.—*Dices*, Dej.—*Mylabris*, Oliv.(1)

Those, in which these same organs, proportionally larger, present in both sexes eleven very distinct and well separated joints, gradually enlarge, or only terminate regularly in an elongated club, and of which the eleventh or last joint, well separated from the preceding one, is larger and ovoid, constitute the

MYLABRIS, Fab. Oliv. Lat.

Or our Mylabris properly so styled. The respective length of the antennæ varies slightly, and these modifications have an influence on the form of their joints, and principally the intermediate ones. These considerations appear to have induced M. Megerle—Dejean, Catalogue, &c.—to form certain species into the genus *Lydus*; but two of those which he places there—*algiricus*, *trimaculatus*—present to us a much less uncertain and more decided character: the inferior division of the hooks of their tarsi is pectinated, while in the other Mylabres it is simple.

M. chicorii, L.; Oliv., Col. III, 47, I, a, b, c, d, e. Length from six to seven lines; black; pilose; an almost round yellowish spot on the base of each elytron, and two transverse and indented bands of the same colour, one near their middle, and the other before their extremity; antennæ entirely and constantly black. I have occasionally found this species in the vicinity of Paris, but it is much more common in the south of France and other southern parts of Europe. Its vesicating properties are quite as active as those of the Cantharides of the shops. In Italy it is mixed with the latter, or even used alone. The Chinese employ the *M. pustulatus*—Oliv., Ibid., I, f. and II, 10, b(2).

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(1) *Mylabris impunctata*, Oliv., Encyc. Méthod.;—*M. argentata*, Fab.;—*M. lunata*, Fab.;—*M. Bilbergii*, Schœnh.

(2) For the other species, see Encyc. Méthod., article *Mylabre;* Schœnh., Synon. Insect.; and Fischer, Entomog. Imp. Russ., II, xli, and xl, 5, 8—but these synonymes, notwithstanding the excellent Monograph of Bilberg, require a re-examination.

Œnas, Lat. Oliv.—*Meloe*, Lin.—*Lytta*, Fab.

These Insects seem to form the passage from the Mylabres to the following Heteromera. Their antennæ, the length of which is hardly greater than that of the thorax, are nearly of equal thickness throughout. The first joint is almost clavate and obconical; directly after the following one, which is very short, the stem is geniculate, and forms a cylindrical or fusiform body, composed of short, crowded, and, with the exception of the last, which is conoid, transversal joints(1).

In the other Heteromera of the same tribe, the antennæ are always composed of eleven very distinct joints, almost of equal thickness throughout, or smaller near the extremity, and frequently much longer than the head and thorax. They are irregular in several males.

Meloe, Lin. Fab.

In Meloe properly so called, the antennæ are composed of short and rounded joints, the intermediate of which are the largest, and sometimes so disposed, that these organs present in this point, in several males, an emargination or crescent. The wings are wanting, and the elytra, oval or triangular, with a portion of the inner margin crossing each other, only partially cover the abdomen, particularly in the females, where it is extremely voluminous.

According to M. Leon Dufour, the crop of these Insects may be considered as a true gizzard, being furnished internally with callous, and as it were anastomosing plicæ, and separated from the chylific ventricle or stomach, by a valve formed of four principal pieces, each of which results from two hollow cylinders placed back to back, and tridentated posteriorly. The stomach is formed of transverse, well marked, muscular fillets.

They crawl along the ground, or upon low plants on the leaves of which they feed. A yellowish or reddish oleaginous liquid exudes from the articulations of their legs.

In some districts of Spain, these Insects are used in place of Cantharides, or are mixed with them. They are also employed by the Farriers. They were formerly regarded as a specific in hydrophobia. I suspect—Mém. du Mus. d'Hist. Nat.—that our Meloes are the *Buprestes* of the ancients, Insects to which they attributed very noxious qualities, and which, according to them, killed the Oxen that accidentally swallowed them while grazing.

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(1) See Lat., Gener. Crust. et Insect., II, p. 219, and I, x, 10; and the Encyc. Méthod., article *Œnas*.

M. proscarabæus, L.; Leach, Lin. Trans., XI, vi, 6, 7. About an inch long; glossy-black, and densely punctured; sides of the head and thorax, and the antennæ and legs, verging on violet; elytra finely rugose; middle of the antennæ of the male dilated and forming a curve.

According to De Geer, the females deposit in the earth a great number of eggs in piles. The larvæ have six feet and two filaments at the posterior extremity of their body; they attach themselves to Flies, whose juices they suck. M. Kirby thinks that it is an apterous or parasitical Insect, which he calls the *Pediculus melittæ*, and I was formerly of his opinion. M. Walckenaer, in his "Mémoire pour servir à l'Histoire Naturelle des Abeilles Solitaires du genre Halicte," has brought forward all the facts relative to this subject of controversy. I also have since spoken of it in the article *Méloé* of the Nouv. Dict. d'Hist. Naturelle. The same Insect is the type of the genus *Triongulin* of M. Leon Dufour—Ann. des Sc. Nat., XIII, ix, B—already noticed in our expose of the Parasita. But the late researches of Messrs Lepeletier and Serville, who by isolating several females have obtained larvæ from their eggs exactly similar to those described by De Geer, or Triongulins, compel us to believe that they are those of Meloes. We know that several Heteromera deposit their ovā in the nests of various Bees. Is it not possible that this may be the fact with respect to the Meloes, and that their larvæ live on these Bees, until the period at which these hymenoptera insure the existence of their young ones, and that also of their enemies, which then establish themselves in the provisioned cells?

M. majalis, Oliv. Panz.; Leach, Ibid., I, 2. The antennæ regular and almost similar in both sexes; body bronze and cupreous-red mixed; head and thorax deeply punctured; elytra scabrous; cupreous and transverse bands on the abdomen. It had been considered as the *M. majalis* of Linnæus, a species which is found in Spain and Roussillon(1).

All the Heteromera of the following subgenera are furnished with wings, and their elytra, as usual, extend longitudinally over the abdomen.

Of these subgenera we will first describe those in which the elytra are not abruptly subulate near their posterior extremity, and where they completely cover their wings. In

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(1) For the other species, see Leach, Monog., cit., that of Meyer, Fabricius, Olivier, &c. The *M. marginata*, Fab., is a Galeruca.

Tetraonyx, Lat.—*Apalus*, Fab.—*Lytta*, Klüg,

The maxillæ, as in Cantharis and Zonitis, are not prolonged and terminated by a silky thread, and curved inferiorly. The penultimate joint of the tarsi is emarginated or almost bilobate, and the thorax forms a transverse square. These Insects are closely related to the Cantharides, and are peculiar to the western continent(1).

Cantharis, Geoff. Oliv.—*Meloe*, Lin.—*Lytta*, Fab.

All the joints of the tarsi entire, and the thorax almost ovoid, slightly elongated, narrowed anteriorly and truncated posteriorly, by which this subgenus is distinguished from the preceding one. The second joint of the antennæ is much shorter than the following one, and the last of the maxillary palpi is evidently larger than those that precede it. The head is a little wider than the thorax. These characters distinguish it from Zonitis. The antennæ of the males are sometimes irregular and even semipectinated.

C. vesicatorius; Meloe vesicatorius, L.; Oliv., Col. III, 46, I, 1, a, b, c. (The Spanish Fly.) From six to ten lines in length, of a glossy golden-green, with simple, regular, black antennæ. This Insect, well known from its medical uses, has furnished M. Victor Audouin, with the subject of an excellent Memoir published in the Ann. des Sc. Nat., IX, p. 31, pl. xlii and xliii; he there minutely describes its anatomy, the external sexual differences which had hitherto remained unnoticed, its mode of copulation, &c. Excellent figures, drawn with the greatest care by Guerin, give additional value to these interesting facts.

This Insect appears in France, near the time of the summer solstice, and is more particularly found about the Ash and Lilac, on the leaves of which it feeds; it diffuses a highly penetrating odour. The larva lives in the ground and gnaws the roots of plants. In the United States of America, the species called by Fabricius the *vittata*, and which abounds on the potato plants, is applied to the same uses as the one of which we are speaking(2).

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(1) Lat., Zool., and Anat., of Messrs Humboldt and Bonpland, pl. xvi, 7;—*Apalus quadrimaculatus*, Fab.; *Lytta bimaculata*, Klüg, Spec. Entom. Brasil., XLI, 10;—*Lytta sex-guttata*, Klüg;—*Lytta crassa*, ejusd., XLI, 12.

(2) See Fabricius, Olivier, Schœnherr; the Entomog. Imp. Russ. of Fischer; the Spec. Entom. Bras. of Klüg, and the Insect. Spec. Nov., Germar.

Zonitis, Fab.—*Apalus*, Oliv.

The antennæ, those of the males particularly, more slender than in Cantharis, and the length of their second joint at least equal to half that of the third. The maxillary palpi are filiform, and the last joint is almost cylindrical. The head is somewhat prolonged anteriorly, and is the width of the thorax. These Insects are found on flowers(1).

The males of the two following subgenera present a truly insulated character: the terminal lobe of their maxillæ is extended into a sort of thread, more or less long, silky and curved. Such is

Nemognathus, Lat.—*Zonitis*, Fab.

Where the antennæ are filiform, with the second joint shorter than the fourth; the thorax is almost square, or rounded laterally(2).

Gnathium, Kirb.

Where the antennæ are somewhat larger towards the extremity, with their second joint almost as long as the fourth. The thorax is bell-shaped, and narrowed anteriorly(3).

Finally, the last subgenus of this tribe, or

Sitaris, Lat.—*Apalus*, Fab.

Is remarkable for the abrupt narrowing of the posterior extremity of the elytra, which exposes a portion of the wings. Independently of this, these Insects bear a close resemblance to Zonitis, living in their larva state, like those of the latter subgenus, in the nests of some of the solitary Mason Bees. In *Apalus*, Fab., properly so called, the elytra are somewhat less narrowed, and the internal extremities of the joints of the antennæ are slightly dilated in the manner of little teeth(4).

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(1) The *Zonitis* of Fabricius, those species excepted which belong to the following subgenus. See also Encyc. Méthod., article *Apale*.

(2) The *Zonitis chrysomelina*, *rostrata*, and *vittata*, Fab. See Lat., Gener. Crust. et Insect., II, p. 222.

(3) *Gnathium Francilloni*, Kirb., Lin. Trans., XII, xxii, 6. This subgenus, from the form of the antennæ and that of the thorax, should come directly after that of Cantharis. The tribe should be terminated by Sitaris and Zonitis.

(4) See Lat., Ibid, p. 221; Schœnh., Synon. Insect., I, ii, p. 341;—*Apalus bimaculatus*, Fab.

Messrs Lepeletier and Serville, in the Encyc. Méthod., article *Sitaris*, mention a new genus, *Onyclenus*, allied to the preceding, but in which one of the divisions of the hooks of the tarsi is dentated. The *Lydus* of Megerle and Dejean, as we have already seen, presents the same character.

The third general section of the Coleoptera, that of the TETRAMERA, consists exclusively of those in which all the tarsi are quadriarticulated(1).

All these Insects live on vegetable matters. The feet of their larvæ are usually very short, and they are even wanting or are replaced by mammillæ in a great number. The perfect Insect is found on the flowers or leaves of plants.

I will divide this section into seven families. The larvæ of the first four or five most commonly live concealed in the interior of plants, and are generally destitute of feet, or have but very small ones; many attack the hard or ligneous portions of their domicil. These Coleoptera are the largest of the section.

FAMILY I.

RHYNCHOPHORA(2).

This family is distinguished by the entire prolongation of the head, which forms a sort of snout or proboscis.

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(1) If the first joint of a Pentamerous tarsus be very short, and the second acquire in length what the other has lost, the tarsus becomes Tetramerous. Hence, in this respect, some Insects become equivocal.

(2) Since the publication of the first edition of this work, Messrs Germar and Schœnherr have especially devoted their attention to this family, and created a great number of new genera, amounting (in the work published by the latter on these Insects in 1826) to one hundred and ninety-four, exclusive of subgenera. To describe them is so much the more at variance with our plan, as it would compel us to enter into a multitude of very minute details. On this subject, therefore, we refer the reader to our article *Rhynchophore* in the Dictionnaire Classique d'Histoire Naturelle, where we have given a general view of these sections, but in a new, and, as we think, a more natural order. The following is a brief sketch of the same. The Rhynchophora, called by Schœnherr *Cucurlionites*, are divided, according as the antennæ are straight or geniculate, into two great sections, the *Recticornes* or Orthocera, and the *Fracticornes* or Gonatocera. The anatomical observations of M. Leon Dufour seem to strengthen this distinction. The latter are furnished with salivary vessels, while in the former they are wanting. These form four tribes, the *Brucheles*, the *Anthribides*, the *Attelabides*, and the *Brentides*. The labrum and palpi are very visible in the two first; these palpi are filiform or larger at the extremity; they are very small and conical in the two other tribes, as in all the following Rhynchophora. The Fracticornes form a fifth tribe, that of the *Cu-*

The abdomen is bulky in most of them, the antennæ geniculate, and frequently clavate. The penultimate joint of the tarsi is almost always bilobate. The posterior thighs are dentated in several.

The larvæ have an oblong body, and resemble a small, very soft, white worm; their head is squamous, and they are destitute of feet, or in lieu of them there are merely small mammillæ. They gnaw various parts of plants. Several live exclusively in the interior of their fruit or seeds, and frequently do us much injury. Their chrysalides are enclosed in a shell. Many of the Rhynchophora, when very abundant within certain limits, are even very noxious in their perfect state. They tap the buds or leaves of various cultivated vegetables, useful or necessary to man, and feed on their parenchyma.

In some the labrum is apparent, the anterior elongation of their head short, broad, depressed, and in the form of a snout; the palpi are very visible and filiform, or larger at the extremity. They compose the genus

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curlionites. They are divided into the Brevirostres and Longirostres, thereby indicating the insertion of their antennæ. In the former, these organs, at their origin, are even with the base of the mandibles, and behind or nearer the head in the other. The genera of the Brevirostres are arranged in three sub-tribes, viz. the *Pachyrhyncides*, *Brachycerides*, and *Liparides*, which correspond to the genera *Curculio*, *Brachycerus*, and *Liparus* of Olivier; the last also comprises some of his *Lixi*. The relative size and form of the mentum, the mandibles, the presence or absence of wings, the direction of the lateral sulci of the proboscis, or rather of the proboscis-snout (museau-trompe), where the first joint of the antennæ is partly lodged, the length of that joint, the proportions and forms of the thorax, and other very secondary considerations, furnish the characters of these various groups. The Cucurlionites Longirostres are divided into two principal sections from their habits, and the composition of their antennæ. In the *Phyllophagi*, they consist of ten joints at least, and the three last, at least, form the club which terminates them. Those of the *Spermatophagi* present at most but nine joints, of which the last, or two last at most, constitute the club. The legs of the Phyllophagi are sometimes contiguous at their origin, and sometimes remote. Those in which they touch are divided into four tribes: the *Lixides* (Lixus, Fab.), the *Rhynchænides* (Rhynchæus, Oliv.), *Cionides* (Cionus, Clairv.), and the *Orchestides* (Orchestes, Illig.). The Spermatophagi are divided into three principal sections, or sub-tribes: the *Calandræides* (Calandra, Clairv., Fab.), the *Cossomides* (Cossomus, Clairv.), and the *Dryopthorides* (Dryopthorus, Schœnh.—Bulbifer, Dej.). These latter lead to the Hylesimi, Fab., and other Xylophagi.

BRUCHUS, Lin.

[illegible] subdivided as follows:

[illegible] species in which the antennæ are clavate, or very evidently [illegible] at the extremity, where the eyes are unemarginated, and [illegible] the four anterior tarsi appear to consist of five joints, form [illegible] genus RHINOSIMUS, which, agreeably to this character, we have placed among the Heteromera, but which is allied to the following subgenus by many others.

Those which, with similar antennæ and eyes, have but four joints to all the tarsi and the penultimate bilobate, re-enter that of

ANTHRIBUS, Geoff. Fab.(1)

To which may be united the *Rhinomaceres* of Olivier(2). These Insects are usually found in old wood—others live on flowers. In

BRUCHUS, Fab. Oliv.—*Mylabris*, Geoff.

Or Bruchus proper, the antennæ are filiform and frequently serrated or pectinated; the eyes are emarginated.

The anus is exposed, and the posterior legs are usually very large. The females deposit an egg in the yet diminutive and tender germ of various leguminous cerealia, of the Coffee-tree, Palms, &c., where the larva lives and is metamorphosed. To obtain an issue the perfect Insect detaches a portion of the epidermis in the form of a cap, thus producing those holes but too often found in peas, beans, dates, &c.(3) The perfect Insect is taken on flowers.

B. pisi, L.; Oliv., Col., IV, 79, 1, 6, a, d. Length two lines; black; base of the antennæ and part of the legs fulvous; elytra dotted with grey; a whitish cruciform spot on the anus.

A very noxious little Insect, that in certain seasons has occasioned much damage in North America(4). The

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(1) The *Macrocephala*, Oliv., Col., IV, 80; the *Anthribes*, Nos. 1—3, of Geoffroy—*Anthribus latirostris*, *varius*, *scabrosus*, Fab.

(2) Oliv., Col. V, 87. The *Rhino. lepturoides*, *atelaboides*, Fab. The penultimate joint of the tarsi is not between the lobes of the preceding one, a circumstance which distinguishes them from Anthribus.

(3) These habits are also common to certain small species of Anthribus.

I have not noticed the genus *Rhinaria* of Kirby, because I have no precise idea of it characters. In so concise a work as this, it is impossible for me to give all the generic, or subgeneric sections of M. Schœnherr, without stepping beyond my prescribed limits.

(4) For the other species, see Fabricius and Olivier, Ibid. The *B. rufipes* of

RHÆBUS, Fisch.

Is distinguished from Bruchus by the flexible elytra and bifid hooks of the tarsi(1). The

XYLOPHILUS, Bonnelli,

Is removed from it by the palpi, which are clavate(2).

The others have no apparent labrum; the palpi are extremely small, hardly perceptible to the naked eye, and conical; the anterior prolongation of their head resembles a rostrum or proboscis.

Sometimes the antennæ are at once straight, inserted on the rostrum, and consist of nine or ten joints.

Those, in which the three or four last joints are united into a club, form the genus

ATTELABUS, Lin., and more particularly of Fab.—*Becmares*, Geoff.

They attack the leaves or most tender parts of plants. Most of the females roll up these leaves into a tube or cornet, in which they deposit their eggs, thus preparing a domicil for their young ones, which also furnishes them with food.

The proportions of the rostrum, the manner in which it terminates, as well as the tibiæ and form of the abdomen, have given rise to the four following subgenera: APODERUS, ATTELABUS, RHYNCHITES, and APION. The first is the most distinct. The head of these Insects is narrowed posteriorly, or presents a sort of neck, and is united to the thorax by a kind of rotula. Their snout is short, thick, and widened at the end, a character common to Attelabus, properly so called, but where the head, as in the two other subgenera, is recived into the thorax up to the eyes. Here the snout is elongated into the form of a proboscis. In Rhynchites, it is somewhat widened at the end, and the abdomen is almost square.

R. Bacchus, Herbst.; Oliv., Col. V, 81, ii, 27. Cupreous-red and pubescent; antennæ and extremity of the proboscis black. The larva of this species lives in the rolled leaves of the

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the latter, so common in the vicinity of Paris on various species of Reseda, forms the genus *Urodon* of Schœnherr. The antennæ terminate in three thicker joints forming a club.

(1) *Rhæbus Gebleri*, Fisch., Entomog. Imp. Russ., II, 178, xlvii, 1.

(2) The *Anthicus populneus*, *oculatus*, *pygmæus*, of Gyllenhal.

Vine, from which in certain seasons, and when unusually numerous, they sometimes completely strip the foliage. They are known in some parts of France, by the names of *Lisette*, *Bêche*, &c.

The snout in Apion is not widened at the end, and even frequently terminates in a point. The abdomen is strongly inflated(1).

The following genera have been formed with Rhynchophora, very similar to the Attelabi, but with a narrower and more elongated body.

RHINOTIA, Kirb.—*Belus*, Schœnh.

Where the antennæ gradually enlarge without forming a club, and the body is almost linear(2).

EURHINUS, Kirb.

Where they terminate in an elongated club, of which the last joint is very long in the males(3).

TUBICENUS, Dej.—*Auletes*, Schœnh.

Where they also terminate in a club, but it is perfoliate, and the joints are nearly of a similar length or differ but little. The abdomen also forms a long square, and not an oval, like that of Eurhinus(4).

Those, in which the antennæ are filiform, or where the last joint alone forms the club; where the proboscis, frequently longer in the males than in the females, and often differently terminated, always projects forwards; in which all the other parts of the body are usually much elongated, and the penultimate joint of the tarsi is bilobate, form the genus

BRENTUS, Fab.—*Curculio*, Lin.

These Insects are peculiar to hot climates.

In some the body is linear, and the antennæ, filiform or slightly enlarged towards the extremity, are composed of eleven joints. They constitute the genus

BRENTUS properly so called.

M. Steven has separated from them, under the generic name of

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(1) See Lat., Gener. Crust. et Insect.; Herbstein, Olivier, and Schœnherr.

(2) Kirby, Lin. Trans., XII.

(3) Kirby, Ibid.

(4) Schœnh., Curcul. Dispos. Method., 46; Dej., Catalogue, &c.

Arrhenodes, those species in which the head is as if cut behind the eyes, where the snout is short and terminated by two narrow and projecting mandibles in the males. All the Brenti of North America, and the only species found in Europe—the *B. italica*—belong to this group. The latter, according to the observations communicated to me by M. Savi, Jun., professor of Zoology and Mineralogy at Pisa, is always found under the bark of trees and in the midst of certain Ants which have a similar domicil. M. de la Cordaire, who made a splendid collection of Insects in Brazil, has also informed me that he always found the Brenti under the bark of trees(1).

Others, similar as to the form of their body, have but nine joints in the antennæ, the last of which forms a small club. Such are those which constitute the

ULOCERUS, Schœnh.(2)

In the last, or the

CYLAS, Lat.

The antennæ are composed of ten joints, the last of which forms an oval club. The thorax is as if divided into two knots, the posterior, or that which forms the pedicle, being the smallest. The abdomen is oval(3).

Sometimes the antennæ are distinctly geniculate, the first joint being much longer than the following ones. They form the genus CURCULIO of Linnæus.

We will divide them into the Brevirostres and the Longirostres, according as the antennæ are inserted near the extremity of the proboscis, and even with the origin of the mandibles, or further back, either near its middle or close to its base.

The Brevirostres of this naturalist, according to the system of Fabricius, are divided into two genera.

BRACHYCERUS.

Where all the joints of the tarsi are entire and without brush or pellet beneath. Their short and but slightly geniculate antennæ present externally but nine joints, the last of which forms the club. They are destitute of wings, and their body is very scabrous or uneven. These Insects are peculiar to the south of Europe and to Africa, live on the ground and appear very early in the spring. The women of Ethiopia use one species as a sort of amulet; they pass a string through its body and hang it round their neck(1)—"Voyage de M. Calliaud au fleuve Blanc."

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(1) Lat., Gener. Crust. et Insect., II, p. 244; Oliv., Ibid., 84; Schœnh., Curcul. Dispos. Méthod., p. 70.

(2) Schœnh., Ibid, 75.

(3) Lat., Ibid, p. 268; Olivier, Ibid, 84, bis. For some other genera derived from Brentis, see the Dict. Class. d'Hist. Nat., article *Rhynchophores*.

CURCULIO.

Where almost the whole under part of the tarsi is furnished with short and stiff hairs, forming pellets, and their penultimate joint is deeply bilobate. Their antennæ are composed of eleven joints, or even of twelve if we count the false one, which sometimes terminates them, the last of which form the club.

As this genus, although much more restricted than in the Linnean system, still comprises numerous species discovered since the time of that naturalist, various savans, Germar and Schœnherr in particular, have divided it into many others. It may be separated, from our own observations, into two principal divisions.

1. Those in which the mentum, more or less widened superiorly, and more or less orbicular, occupies all the width of the buccal cavity, and entirely or very nearly conceals the maxillæ, and where the mandibles are not very sensibly dentated, or merely present a slight sinus under the joint.

We may form a first subgenus,

CYCLOMUS,

Of those Brevirostres in which, as in the preceding ones, the tarsi are destitute of a brush, and the penultimate joint is entire or slightly emarginated, and without very distinct lobes. To it should be referred the *Cryptops*, *Deracanthus*, *Amycterus*, and *Cyclomus* of Schœnherr(2).

The tarsi of all the others are furnished with a brush, and the penultimate joint is deeply bilobate.

Some are provided with wings.

Here the lateral sulci of the proboscis are oblique and directed inferiorly. The anterior legs differ but little in their proportions from the following ones. They form a first subgenus, that of

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(1) Oliv., Col., 82. M. Schœnherr forms the genus *Episus* with the species called the *rostratus*. The thorax is elongated and almost linear.

(2) These genera seem to connect themselves with the *Myrniops* and *Rhytirhinus* of this author, and in that case the Brachyceri should be placed further back. See our article *Rhynchophores* in the Dict. Class. d'Hist. Nat.

Curculio proper(1),

Which comprises a great number of the genera of Messrs Germar and Schœnherr, the characters of which are of but little importance and frequently very equivocal. At most, we can only detach those whose antennæ are proportionally longer.

Among those in which the antennæ are short, the thorax is longitudinal and forms a truncated cone, the shoulders are salient, and of which the genera *Entimus, Chlorima*, &c. have been formed, come certain species from South America, remarkable for their splendour and frequently for their size.

C. imperialis, Fab.; Oliv., Col. V, 83, i, 1. A brilliant golden-green with two black and longitudinal bands on the thorax; ranges of golden-green impressed points on the elytra, with black intervals.

C. regalis, L.; Oliv., Ibid. I, 8. A blue-green, with very brilliant cupreous or golden bands on the elytra. It is found in St Domingo and Cuba.

The name of *fastuosus, nobilis*, &c. given to other species, indicates the magnificence of their attire.

One of those that inhabit France, which is most analogous to the preceding, is the *C. viridis; Chlorima viridis*, Dej.; *Curculio viridis*, Oliv., Ib., ii, 11. It is about five lines in length; the first joint of the antennæ is proportionally shorter than in the preceding species; obscure-green above; sides and inferior parts yellow; the termination of the elytra is somewhat pointed; the proboscis is carinated. Very rare in the environs of Paris.

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(1) 1. Thorax lobate anteriorly.

The genera *Entimus, Rhigus, Promecops, Phædropus, Dereodus* (subgenus of Hypomeces), *Polydius, Entyus* of Schœnherr, and the *Brachysoma* of Dejean, but reduced to the species which he calls the *suturalis*.

2. Thorax non-lobate anteriorly.

* Thorax sensibly longer than it is wide.

* Proboscis shorter than the head, or at most of equal length.

The genera *Clorophanus, Rhycerus, Anæmerus, Hypomeces, Anymeeus, Astycus, Lissorhinus, Prostenomus?, Artipus, Sitona*, of Schœnherr.

** Proboscis evidently longer than the head.

The genera *Hadropus, Cyphus, Callizonus*.

** Thorax transversal, almost isometrical.

The genera *Eustales, Exopthalmus, Diaprepes, Ptilopus, Pacnæus, Polydrosus, Metallites*. The relative length of the first joint of the antennæ also furnishes good characters, which might be employed before resorting to those drawn from the thorax. See Dict. Class. d'Hist. Nat., article *Rhynchophores*, and my Faun. Nat. du Règne Animal.

Some others, also inhabiting the same country, arranged by Schœnherr in the genus *Polydrosus sericeus*, Gyll., *micans*, *betulæ*, &c.—although small are not less attractive by their golden or silvery-green colour. In some the mandibles of the males are narrow, pointed, and project forwards. This character is common to species foreign to Europe. The subgenus

LEPTOSOMUS, Schœnh.

Although formed of a single species—*Curculio acuminatus*, Fab. Oliv.—presents such isolated characters, that it may still be retained as a subgenus. The head is elongated posteriorly and the snout is very short. The thorax is almost cylindrical. The elytra terminate in the manner of diverging spines. The antennæ are short..

We now pass to another subgenus, that of

LEPTOCERUS,

Which differs from the first in the two anterior legs, which are larger than the following one, with the thick thighs, arcuated tibiæ, and the tarsi frequently dilated and ciliated. The antennæ are usually long and slender. The thorax is almost globular or triangular. The abdomen is hardly wider than the thorax.

These Insects are most abundant in Brazil, and several analogous species are found in the Isle of France, or that of Bourbon. Others inhabit Africa(1).

A fourth subgenus, that of

PHYLLOBIUS,

Will include other Brevirostres of the same division, also furnished with wings, but in which the lateral sulci of the proboscis are straight, short, and even consist of a simple fossula. To this we unite various genera of M. Schœnherr—his *Phyllobius*, *Macrorynus*, *Myllocerus*, *Cyphicerus*, *Amblirhinus* and *Phytoscapus*.

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(1) The genera *Prostomus*, *Leptocerus*, *Cratopus*, *Lepropus*, *Hadromerus*, *Hybsonotus*, of Schœnherr. The Hybsonotes have the body proportionally narrower, and more elongated; the proboscis almost as long as the head and thorax; the antennal sulci almost straight, but oblique, and the thorax lobate anteriorly. The Leptoceri are distinguished from all the others, by the length of the first joint of the antennæ, the end of which when thrown back extends beyond the head; in the other genera it extends to but little, if at all beyond the eyes. The Cratopi are peculiar to the Isles of France, Bourbon, and some other islands of the Indian Ocean. Their thorax is trapezoidal, and their abdomen in the form of a reversed triangle. The genus *Prostomus* has, perhaps, been established on males only, their mandibles being sometimes larger than those of the females.

Those Brevirostres, in which the penultimate joint of the tarsi is bilobate, but that are apterous and almost always destitute of a scutellum, will form other subgenera, viz. Othiorhynchus and Omias, in which the antennal sulci are straight; and Pachyrhynchus, Psalidium, Thylacites, and Syzygops, in which those sulci are curved. The Othiorhynci are distinguished from Omias by the auricular dilatation of the lateral and inferior portion of the proboscis, which gives the insertion to the antennæ; the Syzygops, or Cyclops of Dejean, by their eyes, almost united superiorly; the Psalidia by their salient and arcuated or crescent-shaped mandibles. The Thylacites are removed from the Pachyrhynci by their attenuated antennæ, as long or nearly as long as the thorax, whilst here they are thick and much shorter. The abdomen also is ventricose. To *Omias*(1) and *Thylacites*(2) we unite several of the genera of Schœnherr. We may retain that of Hyphantus, closely related to *Othiorhynchus*(3), but distinguished from it by the thorax, which, compared to the abdomen, is very large and almost globular.

Our second general division of the genus Curculio of Fabricius differs from the first in the narrowing of the mentum, which, not occupying the whole width of the buccal cavity, leaves the jaws exposed on each side, and in the mandibles that are evidently dentated. The club of the antennæ is frequently formed by the five or six last joints.

Some have scarcely more than two teeth in the mandibles. Their labial palpi are distinct. The club of the antennæ, which is tolerably abrupt, only commences at the eighth or ninth joint, and is not elongated and fusiform.

The body, although frequently oblong, is not of the same figure.

Some are apterous, and their tarsi are destitute of pellets. Their penultimate joint is slightly bilobate.

Such is the subgenus Myniops, Schœnherr, to which may be united his *Rhytirrhinus*.

In others, also apterous, the under part of the tarsi, as in most of the Rhynchophora, is furnished with pellets, and the penultimate joint is strongly bilobate. They form the subgenus Liparus, which will also comprise various other genera of the same author(4).

Those which are winged may form two other subgenera, viz. Hypera, Germ.,—*Phytonomus*, *Coniatus*, Schœnh., where the tibiæ have no hook at their extremity, or but a very small one(1), and that of HYLOBIUS, where there is a very strong one at their inner extremity(2).

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(1) The genera *Peritelus*, *Trachyphlœus*, *Episomus*, *Pholicodes*, *Ptochus*, *Stomodes*, *Sciobius*, *Cosmorhinus*, *Eremnus*.

(2) The *Liophlæus*, *Barynotus*, *Brachyderes*, *Herpisticus*.

(3) To this genus add the genera *Tylodera* and *Elytrodon*.

(4) *Molytes*, *Plinthus*, *Hypporhinus*, *Epirhynchus*, *Geophilus*.

Among the species of the first, one is found on the Tamarisk,—*C. tamarisci*, Fab., which for beauty of colours rivals the most splendid exotics. It is the type of Schœnherr's genus *Coniatus*.

The others, whose mandibles have three or four teeth, present a mentum abruptly narrowed near its superior extremity, truncated, and with scarcely perceptible palpi. Their antennæ terminate almost gradually in an elongated fusiform club. The body has frequently a similar figure. Olivier confounded them with the Lixi, from which in fact they differ but little.

They will compose the subgenus CLEONUS(3).

The Longirostres, or those whose antennæ are inserted beyond the origin of the mandibles, and frequently near the middle of the proboscis, which is usually long, comprise, with some exceptions, the genus *Lixus*, *Rhynchænus*, and *Calandra* of Fabricius.

In the two first the antennæ present ten joints at least, but most commonly eleven or twelve, of which the three last at least form the club.

LIXUS, Fab.

The Lixi almost resemble the Cleoni in their organs of manducation, as well as in the elongated fusiform club of their antennæ, the narrow and elongated figure of their body, and the armature of their tibiæ. The *L. paraplecticus*, whose larva lives in the stem of the *Phellandrium* and produces in Horses which swallow it with the plant the disease called paraplegia, is almost linear. Another species, for which a particular genus—*Rhinocillus*—has been formed on account of its having but very slightly geniculate antennæ, is reputed an odontalgic(4).

RHYNCHÆNUS, Fab.

The Rhynchæni present no such ensemble of characters.

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(1) Refer to it the genera *Aterpus*, *Listroderes*, *Gronops*, *Phytonomus*, *Coniatus*, of Schœnherr.

(2) To his Hylobii, add also the genera *Lepyrus* and *Chrysolopus*.

(3) To this genus of M. Schœnherr, add the following: *Pachycerus*, *Mecaspis* *Rhytideres*, *Stenocorhinus*.

(4) The genera *Rhinocillus*, *Lachnæus*, *Nerthops*, *Larinus*, *Lixus*, *Pacholenus* of Schœnherr. The sexual organs of the Lixi presented characters to M. Dufou not observed by him in any other Coleoptera.

Sometimes the legs are contiguous at base, and there is no sternal fossula for the reception of the proboscis.

Some never leap, and their antennæ are composed of eleven or twelve joints. These are winged.

TAMNOPHILUS.

The Tamnophili, in which the antennæ are but slightly geniculate, short, composed of twelve joints terminated by an oval club, and placed on a short, projecting, and but slightly arcuated proboscis, where the eyes are approximated superiorly, the extremity of the abdomen is exposed, and the tibiæ are armed at the extremity with a stout hook, will form this first subgenus, which we must distinguish from that of Rhinus (*Rhine*), with which Olivier and myself confounded it(1).

Other Rhynchæni are remarkable for their arcuated tibiæ, furnished with a stout hook at the end; their tarsi are long, filiform, but scantily provided with hairs beneath, and the penultimate joint is but very little dilated and simply cordiform. They will compose the subgenus

BAGOUS.

Small Insects which are found in marshes(2).

Some others with the same habits are removed from their congeners by their tarsi, of which the penultimate joint completely encloses the last between its lobes. The last one is frequently destitute of hooks. They will be comprised in the subgenus

BRACHYPUS(3).

In that of

BALANINUS,

We find very singular Rhynchophora; their proboscis is at least as long as the body, and sometimes much longer. The larva of one species—*Rhynchænus nucum*, Fab.—feeds on the filbert(4). That of

RHYNCHÆNUS proper

Only differs from the preceding subgenera in negative characters, and from the following subgenus in the antennæ, which consist of twelve joints(1). In

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(1) The genera *Læmosaccus*, *Tamnophilus* of the same.

(2) The genera *Bagous*, *Hydronomus*, *Lyprus*, of the same.

(3) The genera *Brachypus*, *Brachonyx*, *Tanysphyrus*, *Anoplus*, of Schœnherr.

(4) The genera *Balaninus*, *Antliarhinus*, *Erodiscus*, of the same.

SYBINES

We find but eleven, seven of which are anterior to the club(2). Those are deprived of wings. Such is the subgenus

MYORHINUS, Schœnh.—*Apsis*, Germ.

To which we will unite the genera *Tanyrhynchus*, *Solenorhinus*, *Styphlus*, *Trachodes*—*Comasinus*, Dej.—of Schœnherr.

We now pass to those which have but nine or ten joints in the antennæ, and possess the faculty of leaping.

CIONUS, Clairv.

The Cioni do not leap, and they have nine or ten joints in their antennæ. Their body is usually very short and almost globular. Several of them, together with their larvæ, live on the Verbascum and Scrophularia(3).

Next come those in which the posterior thighs are very stout, which enables them to leap. The antennæ consist of eleven joints. The body is short and ovoido-conical.

Those, whose antennæ are inserted into the proboscis, form the subgenus

ORCHESTES, Illig.—*Salius*, Germ.(4)

Those in which they originate between the eyes, that of

RHAMPHUS, Clairv.(5)

In the last Rhynchæni of which we have to speak, the legs are remote at base, and the sternum frequently presents a cavity of more or less extent, which receives the proboscis, and even frequently the antennæ.

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(1) The genera *Heilipus*, *Orthorhinus*, *Paramecops*, *Pissodes*, *Penestes*, *Erirhinus*, *Anthonomus*, *Euderes*, *Derelomus*, *Coryssomerus*, *Accalopistus*, *Endæus*, *Tychius*, *Sternechus*, and *Tylomus* of the same.

(2) The genera *Sybines*, *Microtogus*—a subgenus of Tychius, the genus *Ellescus*, Dej.—*Bradybatus* (*Rhinodes*, Dej.).

(3) The genera *Cionus*, *Mecinus*, *Gymnætron*, Schœnh., in which the antennæ consist of ten joints; the genus *Nanodes* of the same, and that of *Prionopus*, Dalman, where there are nine. See Oliv., Col., V, p. 106.

(4) Oliv., Ibid, p. 87.

(5) Oliv., Ibid, p. 39.

Those, in which it does not exist, may form two subgenera, viz. that of

AMERHINUS,

Where the body is oval or almost cylindrical and convex beneath(1); and that of

BARIDIUS,

Where it is depressed and rhomboidal(2).

Those Rhynchæni of Fabricius, in which the sternum presents a cavity for the reception of the proboscis, have been arranged by M. Schœnherr in a great many genera, which we will reduce in the following manner.

They are either winged or apterous.

Of the former, some are almost rhomboidal, with the thorax abruptly narrowed in the manner of a tube near its anterior extremity; the abdomen is almost triangular. They are connected with the Baridii.

Here the antennæ are composed of twelve joints.

CAMPTORHYNCHUS—*Eurhinus*, Schœnh.

The Camptorhynchi are distinguished from all the following subgenera by their antennæ, which, from the bend, form a thick, perfoliate club(3).

CENTRINUS,

Where the scutellum is distinct and the abdomen completely covered by the elytra, the eyes are remote, and the club of the antennæ is elongated. There is frequently a tooth or horn on each side of the cavity of the pectus(4).

ZYGOPS.

Where the eyes are very remarkable, being extremely large and closely approximated or united superiorly, as well as the generally long legs, of which the posterior at least are very remote(5).

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(1) The genera *Amerhinus*, *Netarhinus*, *Alcides*, *Solenopus*, of Schœnherr.

(2) The genera *Rhinastus*, *Cholus*, *Dionychus*, *Platyonyx*, *Madarus*, *Baridius*.

(3) M. Kirby having already applied the name of Eurhinus to another genus of this family, it became necessary to change the denomination of this one.

4) See Schœnherr.

(5) His genera *Zygops*, *Mecopus*, *Lechriops*.

CENTORHYNCHUS.

Where the scutellum is hardly apparent, and the elytra, rounded at the extremity, do not entirely cover the abdomen. The eyes are remote. The club of the antennæ is oval, and the extremity of the tibiæ is without spines(1).

There, the antennæ have but eleven joints.

HYDATICUS(2).

Others have the body ovoid, short, strongly inflated above, with the circumference of the abdomen clasped by the elytra. The thighs are canaliculate, and receive the tibiæ in their sulcus. Their eyes are large. The antennæ always consist of twelve joints.

OROBITIS(3).

Others, with an oblong, convex body, and the anterior legs usually longer, particularly in the males, with antennæ consisting of twelve joints, the eyes remote, and elytra covering the abdomen, will form the subgenus

CRYPTORHYNCHUS(4).

Those which are apterous, or where the wings are at least very imperfect and the scutellum is wanting, will form another, or

TYLODE.—*Ulosomus*, *Seleropterus?* Schœnh.

M. Chevrolat has discovered one species—*Rhynchænus ptinoides*, Gyll.—in the vicinity of Paris.

The remaining Longirostres have generally nine joints at most in the antennæ, and the last, or two last at most, form a club with a coriaceous epidermis and spongy extremity. They feed, at least while in the state of larvæ, on seeds or ligneous substances.

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(1) His genera *Centorhynchus*, *Mononychus*.

(2) Add his *Amalus*.

(3) The *Orobitis*, *Diorymerus*, *Ocladius*, *Cleogonus*, of Schœnherr.

(4) The genera *Arthosternus*, *Pinarus*, *Cratosomus*, *Macromerus*, *Cryptorhynchus*, of Schœnherr. The *Gasterocerus* of Messrs Brullé and Laporte appears to me to belong to the *Cratosomus* proper of Schœnherr, or those in which the proboscis is straight and flattened. His subgenus *Gorgus* is composed of large species, all from South America, and in the males of which the proboscis is usually armed with two teeth or horns near the insertion of the antennæ. I could not find any dentation in the mandibles, one of the characters which distinguish the Crato-Cryptorhynchi, where these organs are dentated.

They may be united in the single genus

CALANDRA,

Which may be divided into six subgenera.

The two first are apterous, and present, as well as the preceding and following ones, the last excepted, four joints in all the tarsi, and of which the penultimate is bilobate. The antennæ are geniculate and inserted at but a little distance from the middle of the proboscis.

In the first or

ANCHONUS, Schœnh.

These organs present nine joints before the club. The tenth, and perhaps two others, but intimately united with the preceding one, and but little distinct, form a short ovoid club.

In the second

ORTHOCHÆTES, Germ.(1)

It is the eighth which forms the club, the figure and composition of which appear to be the same as in Anchonus.

The other four subgenera are furnished with wings.

In the three following ones the tarsi consist of but four joints, the penultimate of which is bilobate.

RHINA, Lat.—*Lixus*, Fab.

The antennæ are strongly geniculate, and inserted near the middle of the straight, projecting proboscis, their eighth joint forming a highly elongated and almost cylindrical club. The anterior legs, at least in the males, are longer than the others(2). In

CALANDRA properly so called,

The antennæ are strongly geniculate, but inserted near the base of the proboscis; their eighth joint forms an ovoid or triangular club.

C. granaria; Curculio granarius, L., Oliv., Col. V, 83, xvi, 196. But too well known; its body is elongated and brown; thorax as long as the elytra and punctured. Its larva, known by the name of weevil (*genre*), is the destroyer of our granaries.

C. oryzæ; Curculio oryzæ, L.; Oliv., Ib., VII, 81. Similar to the preceding, but with two fulvous spots on each elytron. It attacks rice.

C. palmarum; Curculio palmarum, L.; Oliv., Ib., II, 16. Length an inch and a half; club of the antennæ truncated; entirely black, with silky hairs at the extremity of the proboscis. It lives on the pith of the Palms of South America. The inhabitants of that country consider its larva; called the *ver-palmiste*, as a great delicacy(1).

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(1) Insect. Spec. Nov., p. 302.

(2) *China barbirostris*, Lat., Oliv.;—*R. scrutator*, Oliv.

In the fifth subgenus, or

COSSONUS, Clairv.

We observe antennæ hardly longer than the head and proboscis, with eight joints anterior to the club. They are stout, and inserted near the middle of the proboscis(2).

The last or

DRYOPTHORUS, Schœnh.—*Bulbifer*, Dej.

With respect to the tarsi is anomalous. They consist of joints, neither of which is bilobate. The antennæ have but six joints, the last forming the club(3).

FAMILY II.

XYLOPHAGI.

In our second family of tetramerous Coleoptera, we find the head terminating as usual, without any remarkable projection, in the form of a proboscis or snout. The antennæ are thicker near the extremity, or perfoliate at base, always short, and consist of less than eleven joints in a great number. The joints of the tarsi are usually entire(4), the penultimate being sometimes widened and cordiform in others; in this case the antennæ always terminate in a club, either solid and ovoid, or trifoliate, and the palpi are small and conical.

These Insects mostly live in wood which is perforated and channelled in various directions by their larvæ. When they happen to abound in forests, those of Pines and Firs particularly, they destroy in a few years immense numbers of trees, which are rendered useless for any purpose of art. Others do great injury to the Olive, and some again feed on Mushrooms.

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(1) The genera *Sipulus* (*Acorhinus*, Dej.). *Oxyrhynchus*, *Rhynchophorus* (*Calandra*) of Schœnherr. See the article *Calandre* of Olivier.

(2) The genera *Amorphocerus*, *Cassonus*, *Rhincolus*, of Schœnherr.

(3) *Lixus*, *Lymexylon*, Fab.

(4) Their number in some appears to amount to five. These Insects seem to connect themselves with the Crytophagi and other analogous Pentamera.

We will divide this family into three sections.

1. Those in which the antennæ are composed of ten joints at most, sometimes terminating in a stout club, most commonly solid, and sometimes consisting of three elongated leaflets; and at others forming a cylindrical and perfoliate club from their base, and in which the palpi are conical. The anterior legs of the greater number are dentated and armed with a stout hook, and the tarsi, of which the penultimate joint is frequently cordiform or bilobate, are susceptible of being flexed on them.

Some have very small palpi, the body convex and rounded above, or almost ovoid, the head globular and plunged into the thorax, and the antennæ solid or trilamellate, and preceded by five joints at least.

These Xylophagi form the genus

SCOLYTUS, Geoff.

Confounded by Linnæus with the Dermestes.

Sometimes the penultimate joint of the tarsi is bilobate, and there are seven or eight joints in the antennæ anterior to the club. In

HYLURGUS, Lat.—*Hylesinus*, Fab.

The club of the antennæ is solid, almost globular, obtuse, not at all or but slightly compressed, and annulated transversely; the body is almost cylindrical(1).

HYLESINUS, Fab.

Where the club of the antennæ is also terminated in a solid club, but slightly or not at all compressed, and annulated transversely, but tapering to a point. The body is almost ovoid(2).

In the two following subgenera this club is still solid, but strongly compressed; its inferior joints form concentric curves. In

SCOLYTUS, Geoff.—*Hylesinus*, Fab.—*Eccoptogaster*, Herbst. Gyllenh.

Or Scolytus properly so called, the antennæ are straight, beardless, and inserted close to the inner margin of the eyes, which are narrow, elongated, and vertical(3).

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(1) Lat., Gener. Crust. et Insect., II, p. 274; Gyll., Insect., Suec., IV, p. 618.

(2) Lat., Ib., p. 279.

(3) Lat., Ib., p. 278; Gyll., Insect. Suec., III, p. 215, and IV, p. 279.

Camptocerus, Dej.—*Hylesinus*, Fab.

Where the antennæ of the males are strongly geniculate and furnished exteriorly with long hairs or threads; they are inserted at a considerable distance from the eyes, which are elliptical and oblique(1).

Ploiotribus, Lat.—*Hylesinus*, Fab.

The Ploiotribi are removed from all the other Insects of this family by the club of their antennæ, which is composed of three elongated leaflets(2).

Sometimes all the joints(3) of the tarsi are entire, and the club of the antennæ, always solid and compressed, commences at the sixth or seventh joint. In

Tomicus, Lat.—*Ips*, De Geer,—*Bostrichus*, Fab.

The antennæ are not susceptible of being folded under the eyes, and their club is distinctly annulated. The head is rounded above, and almost globular(4).

There is an emargination on the side of the thorax. The tibiæ are not striated. The tarsi, at most, are as long as the latter with the first joint but slightly elongated. The body is cylindrical, and the eyes are elongated and somewhat emarginated(5).

Platypus, Herbst.—*Bostrichus*, Fab.

The antennæ, shorter than the head, fold under the eyes and terminate in a very large club without distinct annuli. The body is linear, and the head cut vertically before; the eyes are almost round and entire. The thorax is emarginated on each side to receive a portion of the anterior thighs; the two anterior tibiæ are divided on their posterior face by transverse ridges; the tarsi are long and very slender, their first joint being much elongated. The two posterior legs are placed very far back(1).

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(1) *Hylesinus æneipennis*, Fab.

(2) Lat., Ib., p. 280.

(3) They appear to be five in number; the penultimate is very small. The two posterior legs are very remote from the preceding ones, and the body is cylindrical or linear. The antennæ are very short.

(4) Broadly trilobate behind. According to M. Dufour their chylific ventricle, which forms two thirds of the whole length of the alimentary canal, is covered with papillæ, while that of the Bostrichi is perfectly smooth. The same naturalist has observed worms, resembling Ascarides, in the intestinal canal of the former, as well as in that of various other Coleoptera.

(5) Lat., Gener. Crust. et Insect., II, p. 276.

The others have large and very apparent palpi of unequal lengths. Their body is depressed and narrowed before; their antennæ sometimes consist of two joints, the last of which is very large, flattened, and almost triangular or nearly ovoid, and sometimes of ten, and are entirely perfoliate.

The labium is large; the elytra are truncated, and tarsi short, with all the joints entire. These Insects are all foreign to Europe and compose the genus

Paussus, Lin. Fab.

Those in which the antennæ consist of but two joints, with the last large and compressed, form the subgenus

Paussus proper.

A species—*P. bucephalus*, Schœnh., Synon. Insect., I, 3, App. VI, 2—in which the head resembles two simple eyes; where the eyes are small and but slightly prominent, and where the antennæ, hardly longer than the head, are laid on its anterior face, and terminated in an acuminated joint, constitutes the genus *Hylotorus* of Dalman—Anal. Entom., p. 102(2).

Those in which the antennæ consist of ten entirely perfoliate joints form the subgenus

Cerapterus, Swed.(3)

2. A second section will comprise those Xylophagi, whose antennæ consist of but ten joints, and in which the palpi, at least those of the maxillæ, do not gradually taper to a point, but are of equal thickness throughout, or dilated at the extremity. The joints of their tarsi are always entire.

We will divide them into principal genera, according to the mode in which the antennæ terminate. The three last joints form a perfoliate club in the first, or

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(1) Ibid., p. 277. M. Dalman has figured a species—*flavicornis?*, Fab.—enclosed in amber.

(2) See Lat., Gener. Crust. et Insect., III, p. 1, and Schœnherr, Synon. Insect. I, 3, App. vi, 1.

(3) Lat., Gener. Crust. et Insect., III, p. 4.

Bostrichus.

In

Bostrichus, Geoff.—*Apate*, *Synodendron*, Fab.—*Dermestes*, Lin.

Or Bostrichus proper, the body is more or less cylindrical, the head rounded, almost globular, and capable of being received into the thorax as far as the eyes; the thorax is more or less convex before, and forms a sort of hood; the two first joints of the tarsi, as well as the last, are elongated.

B. capucinus; *Dermestes capucinus*, L., Oliv., Col. IV, 77, i, 1. Five lines in length, with a red abdomen and elytra of the same colour. Very common in old wood in timber yards(1).

Psoa, Fab.

The Psoæ only differ from the Bostrichi in their proportionally narrower and more elongated body, with a depressed and almost square thorax. The maxillæ have but one lobe instead of two(2).

Cis, Lat.—*Anobium*, Fab.

Where the body is oval, depressed, or but little elevated, the thorax transversal, rounded, and with a recurved lateral margin, slightly dilated in the middle of the anterior edge; the last joint of the tarsi is much longer than the preceding ones. The head of the males is frequently tuberculated or furnished with horns.

These Insects inhabit the fungi of trees(3). In

Nemosoma, Desmar.—*Ips*, Oliv.—*Colydium*, Hellw.

The body is long and linear; the antennæ are hardly longer than the head; the mandibles are strong, salient and dentated at the extremity; the anterior tibiæ are triangular and dentated exteriorly, and the tarsi slender and elongated(4).

The second genus of this division, or

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(1) For the other species, see Olivier, Fabricius, &c.

(2) See Fabricius and Rossi.

(3) Lat., Gener. Crust. et Insect., III, p. 11, and Gyll., Insect. Suec., III, p. 377, and IV, p. 624. I have seen but a single and badly preserved specimen of the *Sphindus Gyllenhallii*: it appeared to me that this genus differed but little from the present one.

(4) Lat., Gener. Crust. et Insect., III, p. 12, and I, xi, 4.

MONOTOMA,

Is distinguished from the first by the solid and globuliform club—the tenth joint—of the antennæ.

The body is elongated, depressed, and frequently forms a parallelopiped; the anterior part of the head is narrowed, and projects somewhat in the manner of a triangular and obtuse snout. The palpi are very small, and, as well as the mandibles, not salient.

In some, the head is not separated from the thorax by a strangulation or sort of neck, and can be received into it.

SYNCHITA, Hellw. Dej.—*Lyctus*, *Elophorus*, Fab.

Where the anterior extremity of the head is transverse and without any prolongation, where the two first joints of the antennæ are almost identical, and where the thorax, much wider than it is long, is separated from the base of the elytra by an evident interval(1).

CERYLON, Lat.—*Synchita*, Hellw.—*Lyctus*, Fab.

Where the anterior extremity of the head projects in the manner of an obtuse triangle; the first joint of the antennæ is much larger than the second; the thorax is applied posteriorly to the base of the elytra, is wider than it is long, or almost isometrical, and without any recurvature of the margin. The body is almost oval or nearly forms a parallelopiped, and the elytra are truncated posteriorly and cover the whole top of the abdomen(2).

RHYZOPHAGUS, Herbst. Gyll.—*Lyctus*, Fab.

Resembling the preceding in the head, the relative dimensions of the first joints of the antennæ, and the junction of the thorax with the abdomen; but the body is narrow and elongated, the thorax wider than long, with a recurved margin; the elytra are truncated posteriorly. Some authors have asserted, that by their tarsi, they are Heteromerous—I rather think they prove them to be Pentamerous(3).

The others,

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(1) *Cerylon terebrans*, Lat.; *C. juglandis*, Gyll.; *Lyctus juglandis*, Fab.; *Elophorus humeralis*, Ejusd.

(2) *Cerylon histeroides*, Lat., Gyllenhall.

(3) See Gyll., Insect. Suec., I, iii, p. 419.

MONOTOMA, Herbst.—*Cerylon*, Gyll.

Or Monotoma properly so called, have a head of the same width as the thorax, and separated from it by a strangulation.

The two first joints of the antennæ are stouter than the following ones, and almost equal—the first a little larger. The superior extremity of the club, or button, seems to present vestiges of one or two joints. The head is triangular, and somewhat extended into an obtuse snout. The body is elongated, and the thorax longer than it is wide(1).

3. The Xylophagi of the third division have eleven very distinct joints in the antennæ; their palpi are filiform, or thicker at the extremity in some, and smaller in others; all the joints of the tarsi are entire.

We will begin with those in which the club of the antennæ consists of but two joints. They form the genus

LYCTUS.

In some, the mandibles and first joint of the antennæ are completely exposed. The body is narrow, elongated and almost linear; the eyes are large and the thorax is elongated.

LYCTUS, Fab.(2)

In Lyctus proper, the margin of the head covers the whole or greater part of the first joint of the antennæ. The mandibles are not salient. In

DIODESMA, Meg. Dej.

The antennæ are as long as the thorax, the body is a convex, oblong oval, the thorax is almost semiorbicular, and the abdomen nearly oval(3).

BITOMA, Herbst. Gyll.—*Lyctus*, Fab.

Where the antennæ are shorter than the thorax; the body is long, narrow, depressed, and almost a parallelopiped; the thorax is square(4).

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(1) *Cerylon picipes*, Gyllenhall.

(2) See Lat., and Gyllenhall. The genus *Lyctus* of Fabricius is a mixture.

(3) *Diodesma subterranea*, Dej., Catal., p. 67.

(4) See Lat., Gyllenhall.

In the other Xylophagi with antennæ composed of eleven joints, the three or four last form the club, or the last is alone larger than the preceding ones. They are subdivided thus:

Sometimes the mandibles are covered or project but little, as in

MYCETOPHAGUS, Fab.

Here, the antennæ, hardly longer than the head, are inserted under the projecting margin of the head, and terminated abruptly by a tri-articulated, perfoliate club.

COLYDIUM, Fab.

Their body is linear, and the head very obtuse before; the thorax is as wide as the abdomen, and forms a square more or less long; the abdomen is elongated. The two first joints of the antennæ are larger than the following ones, which, to the eighth inclusively, are very short and transversal(1).

There, the antennæ are at least as long as the thorax.

The body is oval, the thorax transversal and widest posteriorly; the first and last joints of the tarsi are elongated, and the antennæ terminate in a perfoliate club, either oval and commencing near the sixth or seventh joint, or abrupt, somewhat oval, and formed of the three last.

They live in mushrooms or under the bark of trees.

MYCETOPHAGUS, Fab.—*Tritoma*, Geoff.

In Mycetophagus proper, the club of the antennæ commences at the sixth or seventh joint; the last is almost ovoid(2).

TRIPHYLLUS, Meg. Dej.—*Mycetophagus*, Gyll.

Where the club of the antennæ is shorter, abrupt, and formed by the three last joints only; the last one is almost globular(3).

Those have an oblong body and the thorax narrower than the abdomen, at least posteriorly; the first joint of the tarsi is the length of the following one, or hardly longer, and the antennæ are terminated by a narrow elongated club, but slightly or not at all perfoliate, formed by the three last joints. The

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(1) See Lat., Fab., Dej.

(2) See Lat., Gener. Crust. et Insect., III, p. 9, first division of the Mycetophagi; and Gyll., Insect. Suec., I, iii, 387, and IV, 630.

(3) See Lat., Ibid., second division; Dej., Mycetophagi, and Gyllenh., Ibid., IV, 631.

MERYX, Lat.

Is distinguished from the following subgenera by the maxillary palpi—always salient—which are terminated by a larger joint in the form of a reversed triangle(1).

DASYCERUS, Brong.

Although the tarsi of the Dasyceri present but three joints, they are connected with this family by other affinities. The two first joints of their antennæ are globular, the following ones very small, capillary and pilose, and the three last also pilose and globular. The head is triangular and distinct from the thorax. The maxillary palpi are salient, small and subulate. The thorax and the elytra are sulcated. The abdomen is almost globular(2).

LATRIDIUS, Herbst.—*Tenebrio*, Lin.—*Dermestes*, Fab.

Where the palpi are very short and subulate; the head and thorax are narrower than the abdomen; the first joint of the antennæ is very stout and globular, and the following ones, to the tenth inclusively, are almost obconical, glabrous, or simply pubescent; the last is larger than the preceding ones and ovoid. The thorax is wider than it is long or almost isometrical, and the abdomen, square or almost oval(3).

SILVANUS, Lat. Gyll.—*Dermestes*, Fab.

Where the body is nearly linear or almost forms a parellelopiped; the thorax, longer than it is broad, is as wide as the anterior part of the abdomen; the first joints of the antennæ are nearly equal, almost turbiniform, and the last is nearly globular; the palpi are almost filiform, and the anterior extremity of the head is somewhat elongated into a sort of triangular and obtuse snout(4).

Sometimes the mandibles are entirely exposed, salient and robust. The body is generally elongated, narrow and depressed. These Insects form the genus

TROGOSITA, Oliv. Fab.—*Platycerus*, Geoff.

In some, the antennæ are shorter than the thorax, or at most of an equal length, and terminated by a compressed and somewhat serrated club, formed by the three or four last joints. The ligula is entire.

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(1) Lat., Gener. Crust. et Insect., III, p. 17, and I, xi, 1.

(2) See Dumeril, Dict. des Sc. Nat., where this Insect is well figured, and Arrh., Faun. Insect. Eur., IV, 5.

(3) See Lat., Ibid., and Gyllenh., Insect. Suec., I, iv, 123.

(4) See Lat. and Gyllenh., op. cit.

TROGOSITA, Fab.

In Trogosita proper, the mandibles are shorter than the head and crossed; the ligula, almost square, is not prolonged between the palpi, and the maxillæ have but a single lobe.

T. mauritanicus; Tenebrio mauritanicus, L.; Oliv., Col. II, 19, i, 2. About four lines in length; blackish above; light brown beneath; elytra striate. Found in nuts, bread, and under the bark of trees. Its larva, known in Provence by the name of *Cadelle*, attacks grain(1).

PROSTOMIS, Lat.—*Megagnathus*, Meg.—*Trogosita*, Fab.

Where the mandibles are longer than the head, and project parallel to each other; the ligula is narrow, elongated and extended between the palpi, and there are two lobes to the maxillæ. The body is long, narrow and almost linear(2).

The antennæ of the others are as long as the body, and of equal thickness, as far as the tenth joint inclusively; the following and last one is larger, in the form of a reversed triangle, and obliquely truncated at the end. The ligula is bifid. They form the

PASSANDRA, Dalm. Schœnh.(3)

FAMILY III.

PLATYSOMA.

Our third family of the Tetramera approaches the second, so far as relates to the internal anatomy, the tarsi, and habits; but the antennæ are of equal thickness throughout, or more slender towards the extremity. The mandibles are always salient, the ligula is bifid or emarginated; the palpi are short, the body is depressed and elongated, and the thorax almost square. These Insects are found under the bark of trees, and may be reduced to a single genus, the

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(1) For the other species, see Oliv., Ibid.

(2) *Trogosita mandibularis*, Fab. Sturm, in his Faun. Insect. Germ., has figured it well, and the parts of the mouth also.

(3) Schœnh., Synon. Insect., I, 3, App., p. 146, vi, 3. These Insects evidently form the passage from this family to the following one. They even only differ from the Platysoma in their antennæ.

For some other genera of the Tetramera, such as *Litophilus*, *Agathidium*, and *Clypeaster*, see the family of the Clavipalpi.

CUCUJUS, Fab.

We distinguish

CUCUJUS, properly so called,

Where the antennæ, much shorter than the body in several, are composed of obconical or turbiniform and almost granose joints, the first of which is shorter than the head(1).

DENDROPHAGUS, Gyll.—*Cucujus*, Fab. Payk.

Where those organs are generally formed of elongated and cylindrical joints, the first of which is longer than the head, and the second and third are shorter than the following ones. The labial palpi terminate in a club(2).

ULEIOTA, Lat.—*Brontes*, Fab.

Where the antennæ are analogous, but where the third joint is as long as the following one, and all the palpi are smaller at the extremity. The mandibles of the species most common in France, the flavipes, and on which M. Dufour has made some anatomical observations, are furnished, in the males, with a long and acute prolongation resembling a horn(3).

FAMILY IV.

LONGICORNES.

Here the under part of the three first joints of the tarsi is furnished with a brush; the second and third are cordiform; the fourth is deeply bilobate, and there is a little nodule re-

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(1) The Cucuji *clavipes*, *depressus*, *rufus*, *bimaculatus*, *piceus*, *testaceus*, *ater*, Oliv., Col., IV, No. 74, bis. See also Gyllenh., Insect. Suec.

(2) Gyllenh., Ibid.

(3) Lat., Gener. Crust. et Insect., III, p. 25. See also Fabricius and Gyllenhall, Ibid.

sembling a joint(1) at the base of the last. The ligula, placed on a short and transversal mentum, is usually membranous, cordiform, emarginated or bifid, corneous and forming the segment of a very short and transversal circle in others(2). The antennæ are filiform or setaceous, most commonly as long as the body at least; they are sometimes simple in both sexes, and sometimes serrated, pectinated, or flabelliform in the males. The eyes of a great many are reniform and surround them at base. The thorax is trapezoidal or narrowed before, in those where the eyes are rounded and entire, or but slightly emarginated; even in this case the legs are long and slender, and the tarsi elongated.

M. Leon Dufour remarks, that in their alimentary canal, as well as in the disposition of their hepatic vessels, these Insects bear a general resemblance to the Melasoma—contrary to the opinion of M. Marcel de Serres, he denies the existence of a gizzard. The alimentary canal, most commonly covered with papillæ, is preceded by a crop, but less or slightly marked in the Lamiæ and Lepturæ, which, according to our system, terminate this family. The testes are formed by distinct, pediculated, and tolerably large spermatic capsules or sacs, which vary in number according to the genus.

As almost all their larvæ live in the interior of trees, or under their bark, they are destitute of feet, or have but very small ones. Their body is soft, whitish, thickest anteriorly, and the head squamous and provided with stout mandibles, but without any other projecting part. They do much injury to trees, the large ones particularly, perforating them very deeply, or boring holes in them in every direction(3). Some of them attack the roots of plants. The abdomen of the females is terminated by a tubular and horny ovipositor. These Insects produce a small sharp sound by the rubbing of the pedicle of the base of their abdomen against the interior of the parietes of the thorax.

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(1) The Parandræ, in this respect, perfectly resemble the Longicornes, and if this little nodule be considered as a true joint, not only this family, but the following one likewise, would belong to the section of the Pentamera. It may in fact represent the fourth joint of the latter, but as it has no peculiar motion, it is understood as forming part of the next.

(2) *Parandra.*

(3) See the Nat. Hist. of the *Lamia amputator*, by M. Langsd. Quilding, Lin. Trans., XIII.

In the system of Linnæus, these Insects form three genera, *Cerambyx*, *Leptura* and *Necydalis*, which Geoffroy, Fabricius, and other naturalists have endeavoured to regulate and simplify by the transposition of species, or by establishing other generic sections. If we consider the number of species that have been discovered since the time of the Pliny of the North, the insufficiency of the characters which designate these genera, and the confusion which still exists in several of them, it will be plain that a general and elaborate revision has become necessary—let us hope that the researches of Messrs Lepeletier and Serville, who have paid particular attention to this family, will remove these difficulties.

We will in the first place divide the Longicornes into two sections.

In those of the first, the eyes are either strongly emarginated or lunate, or elongated and narrow; the head is plunged into the thorax, as far as those organs, without being distinguished from it by an abrupt contraction of its diameter, forming a kind of neck; in several it is vertical.

In some, the last joint of the palpi is sometimes almost in the form of a cone or reversed triangle, and sometimes nearly cylindrical and truncated at the extremity. The lobe terminating the maxillæ is straight, and not curved on the inner one at its end. The head usually projects or is simply inclined, and in those, where, by a very rare exception—the *Dorcaceri*—it is vertical, its width is nearly equal to that of the body, and the antennæ are very remote at base and spinous. The thorax, frequently unequal or square, is rarely cylindrical.

These Longicornes are subdivided into two principal sections or small tribes.

1. The Prionii, characterized as follows: the labrum null or very small and indistinct; the mandibles stout, or even very

large, particularly in most of the males; the internal lobe of the maxillæ null or very small; the antennæ inserted near the base of the mandibles or the emargination of the eyes, but not surrounded by the latter at base; the thorax most frequently trapezoidal or square, crenated or dentated laterally.

The first genus, or

PARANDRA, Lat.—*Attelabus*, De Geer,—*Tenebrio*, Fab.,

Where, as in the following, the antennæ are simple, almost granose, compressed, of equal thickness throughout, and as long as the thorax at most, and the terminal lobe of the maxillæ is very small, scarcely reaching to the extremity of the first joint of the palpi, is distinguished from that genus(1), as well as from all others of the same family, by its corneous ligula, which is in the form of the segment of a very short, transversal circle without emargination or lobes, and by its tarsi, the penultimate joint of which is slightly bilobate, and the last, much longer than the preceding ones taken together, presents between its hooks a little appendage with two terminal setæ. The body is a parallelopiped, and depressed, and the thorax square, rounded at the posterior angles, and without spines or teeth.

These Insects are peculiar to America(2).

SPONDYLIS, Fab.—*Attelabus*, Lin.—*Cerambyx*, De Geer.

The Spondyles, which approximate to the Parandræ in their antennæ and the exiguity of their maxillary lobes, are removed from them by their ligula; the latter, as in all the following Longicornes, is membranous and cordiform. They also differ in the tarsi; the penultimate joint is deeply bilobate, and the last is not longer than the preceding ones taken together, and is without an appendage bearing two setæ between the hooks. The Spondyles are also distinguished from the following genera by their almost globular thorax, the margin of which is neither recurved nor furnished with teeth or spines.

Their larvæ live in the interior of the European Pines and Firs.

S. buprestoides; *Attelabus buprestoides*, L.; Oliv. Col. IV, 71, i, 1. From six to seven lines in length; black; densely punctured, with two elevated and longitudinal lines on each clytron.

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(1) The mandibles of the Spondyles and Parandræ are, at most, as long as the head, triangular or conical and arcuated at the end.

(2) See Latr., Gener. Crust. et Insect., III, 28, and I, ix, 7; Schœnh., Synon. Insect., I, iii, p. 334, and App., p. 145, and Encyc. Méthod., article *Parandre*.

These lines are sometimes obliterated, and the individuals in which this occurs are considered by some entomologists as forming a separate species—the *elongatum*. No others are known(1).

In the third and last genus of this tribe, or

PRIONUS, Geoff. Fab. Oliv.

The antennæ are longer than the head and thorax, serrated or pectinated in some; simple, attenuated near the extremity, and with elongated joints in others. The terminal lobe of the maxillæ is at least as long as the two first joints of the palpi. The body is generally depressed, and the thorax square or trapezoidal, and either dentated or spinous, or angular laterally.

These Insects only fly towards evening or at night, and always remain on trees. Certain species foreign to Europe are remarkable for their great size, and that of their mandibles. The larva of the *P. cervicornis*, which lives in the wood of the Gossampinus, is eaten.

This genus comprises a considerable number of species, which, from the difference in the form and size of their mandibles, antennæ, thorax, and abdomen, might constitute several small groups or subgenera.

We might, in the first place, separate those species in which the body is straight, elongated, or forms a parallelopiped; the thorax is much shorter than the abdomen, square or trapezoidal, and strongly arcuated laterally; the scutellum is small or moderate; the antennæ are simple or but slightly serrated, and the mandibles frequently large in the males.

Among the species of this division, with mandibles shorter than the head, the antennæ almost setaceous, tolerably long, and composed of eleven joints, the third of which is much longer than the following ones, we find the

P. scabricornis, Fab. Oliv., Col. IV, 66, XI, 42. Length an inch and a half; antennæ bristled with small spines; a single tooth on each side of the thorax formed by its posterior angles(2).

Other species, generally less oblong and slightly inclined before, in which the mandibles are always moderate or project but little in both sexes, with the thorax strongly dentated laterally; where the antennæ are pectinated or strongly serrated in the males, and composed of more than eleven joints in several of these individuals; and where the elytra are as long as the abdomen, and cover it superiorly, as well as the wings, would form a second general division.

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(1) See Fab., Oliv., Lat., Gyll., &c., &c.

(2) The Prioni *giganteus*, *cervicornis*, *damicornis*, *maxillosus*, *barbatus*, *faber*, *serripes*, &c., of Fabricius and Olivier.

P. coriarius; Cerambyx coriarius, L.; Oliv., Ib., I, 1. Length, fifteen lines; blackish brown; the antennæ serrated and composed of twelve joints in the male; three teeth on each lateral margin of the thorax. The larva lives in the decayed trunks of Oak and Birch trees. When about to undergo its metamorphosis it enters the earth(1).

It appears to me that other Prionii, peculiar to Brazil, of an analogous form, but with small triangular elytra which do not entirely cover the abdomen—Fam. Nat. du Règne Anim.—should form a distinct genus—ANACOLUS. Messrs Lepeletier and Serville have described two species—*sanguineus, lugubris*—in the Encyclopédie Méthodique.

Finally, others with various and metallic colours in several have a shorter, wider, and almost oval body; the head is frequently prolonged posteriorly behind the eyes; the antennæ are simple and compressed; the mandibles short; the thorax is wide, dilated, arcuated, and unidentated laterally, and obliquely truncated or emarginated at the posterior angles; the abdomen is nearly square, about one-half longer than it is wide. The scutellum is usually large. The ligula is proportionally more elongated(2).

2. The CERAMBYCINI have a very apparent labrum extending across the whole width of the anterior extremity of the head; their two maxillary lobes are very distinct and salient; their mandibles of an ordinary size, and similar or but little different in both sexes; their eyes always emarginated and surrounding, at least partially, the base of the antennæ, which are usually as long as the body or longer; the thighs, or the four anterior ones at least, are commonly in the form of an ovoid or oval club, narrowed into a pedicle at base.

In the first place we have those in which the last joint of the palpi is always manifestly thicker than the preceding ones, and in the form of a reversed triangle, or obconical; where the head is not sensibly narrowed and prolonged anteriorly in the manner of a snout; where the thorax is not widened from before posteriorly, and does not present the figure of a trapezium or truncated cone; and where the elytra are neither very short and squamiform, nor abruptly narrowed a little beyond their base and subulate at the extremity. The species of this subdivision might be designated by the title of *regular* Cerambyci, in contradistinction to those of the following one, which, in many respects, are anomalous, and the last of which seem to be connected with those of the tribe that follows it. They compose the genera *Cerambyx*, *Clytus*, *Callidium* of Fabricius, and some of his *Stenocori*, a different genus from that similarly and previously so named by Geoffroy. They form the genus *Cerambyx* of Linnæus, to which we must also add some of his Lepturæ.

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(1) The *P. brevicornis, imbricornis, depsarius*, &c.

(2) The *P. nitidus, lineatus, Thomæ, bifasciatus, canaliculatus*, &c., Fab.

The *P. Spencii*, Kirby, Lin. Trans., XII, xxii, 13, appears to belong to the same division, or to form a separate one. See Lat., Gener. Crust. et Insect. I, ii, p. 30, et seq.; and Encyc. Méthod., article *Prione*.

Modern entomologists have augmented the number of these generic sections, but their characters are so little distinct, and so much blended, that these genera may all be united in one, or in

CERAMBYX.

A number of species, all from South America, proportionally shorter and wider than the following ones, with the antennæ frequently pectinated, serrated, or spinous, are remarkable for the extent of their thorax, the length of which is almost equal to that of the elytra; sometimes glabrous, it is almost semi-orbicular, and nearly unidentated at the posterior angles; at others it is very uneven and tuberculous. Their præsternum is either carinated or terminated in a point, or plane, truncated, entire or emarginated at its posterior extremity, which is laid on an anterior projection of the mesosternum. Their anterior legs, at least, are remote at base. The scutellum is large in several; the tarsi are short and dilated.

Those of this division, in which the thorax, almost semiorbicular and always very large, is smooth or simply granulous, with a single tooth on each side, at the posterior angles, in which the posterior extremity of the præsternum is plane and truncated, either unemarginated, or marginated and laid on the mesosternum; where the scutellum is always very large, and the legs are very remote, form two subgenera,

LISSONOTUS, Dalm.—*Cerambyx*, Fab.

Where the antennæ are long, strongly compressed, and serrated or pectinated, and where the posterior extremity of the præsternum offers no emargination(1).

Megaderus, Dej.—*Callidium*, Fab.

Where the antennæ are simple, and shorter than the body, and the posterior extremity of the præsternum is emarginated, and receives, in that emargination, the opposite end of the mesosternum, so that they are intimately united or seem to form but one plane(2).

Those, in which the thorax is very uneven, tuberculous, or pluridentated, with the præsternum carinated or terminated posteriorly in a point, have been arranged in four subgenera.

Here the antennæ are long, setaceous and simple, or at most slightly spinous or furnished with fasciculi of hairs.

The thorax is always large, very uneven, and hardly wider than it is long.

Dorcacerus, Dej.—*Cerambyx*, Oliv.

The species of this subgenus are distinguished from all the others by their large vertical head, which is almost as wide as the thorax taken in its greatest transversal diameter, and plain and densely pilose before. The antennæ are very remote. The præsternum is not raised into a carina, and terminates simply in a point. The scutellum is small(3).

Trachyderes, Dalm.—*Cerambyx*, Fab.

Where the thorax is large, much wider than the head, and the posterior (and frequently the opposite) extremity of the præsternum is raised into a carina; where the scutellum is elongated, the elytra are widest at base, and become narrower as they progress towards the extremity; and where the antennæ are not furnished with fasciculi of hairs(4).

Lophonocerus, Lat.

Where the head is also narrower than the thorax, and the posterior extremity of the præsternum is carinated; but this thorax, as well as the scutellum, is proportionally smaller. The elytra are widened towards their extremity, or at least do not become narrower;

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(1) See Schœnh., Synon. Insect.; Dalman, Anal. Entom.; and Germar, Insect. Spec. Nov.

(2) *Callidium stigma*, Fab.; Dej., Catal., p. 106.

(3) *Cerambyx barbatus*, Oliv.; Dej., Ibid., p. 105.

(4) Schœnherr, Synon. Insect., I, 3, p. 364.

the third joint of the antennæ, and the three following ones are furnished with fasciculi of hairs(1).

There, the antennæ are shorter than the body, and pectinated or serrated. The thorax is transversal and dentated laterally. The elytra are widened posteriorly.

CTENODES, Oliv. Klüg(2).

Now the thorax, either almost square or cylindrical, or orbicular or nearly globular, is much shorter than the elytra, at least in those in which it is extended in width, and the præsternum presents neither carina nor pointed prolongation at its posterior extremity. The scutellum is always small, and the legs are approximated at base.

A single subgenus,

PHŒNICOCERUS, Lat.

Is removed from the following ones by the form of the antennæ of the male, the joints of which, commencing with the third, are prolonged into long and narrow laminæ forming a large fascis or fan. But a single species is yet known—*P. Dejeanii*—and that is peculiar to Brazil.

In the others, the antennæ, at most, are spinous, or slightly serrated.

Several, which are very remarkable for their colours, and the agreeable odour they diffuse, present an anomaly with respect to the relative proportions of their palpi: the maxillary palpi are smaller than the labials, and even shorter than the terminal lobe of the maxillæ which frequently projects. Their body is depressed, and the anterior part of the head narrowed and pointed; the posterior tibiæ are often strongly compressed.

They compose the subgenus

CALLICHROMA, Lat.—*Cerambyx*, Fab. Dej.

Among the species with simple, setaceous antennæ, and a dilated thorax, spinous and tuberculated on the middle of its sides, and in which the posterior thighs are elongated and their tibiæ strongly compressed, there is one in France, found on the Willow, that diffuses a strong odour of roses.

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(1) *Cerambyx barbicornis*, Oliv.;—*Trachyderes hirticornis*, Schœnh.; *Cerambyx hirticornis*, Kirby.

(2) Oliv., Col., VI, 59, bis, I, 1; Schœnh., Synon. Insect., I, 3, p. 346;—The *Ctenodes zonata*, *minuta*, *geniculata*, Klüg, Entom. Bras., XLII, 1, 2, 3. As the only knowledge I have of these Insects is through drawings, I merely place them here from analogy.

C. moschatus; *Cerambyx moschatus*, L., Oliv., Col. IV, 67, xvii, 7. It is about an inch long, entirely green or of a deep blue, and somewhat gilded in certain individuals.

C. ambrosiacus, Stev., Charpent. Very similar to the preceding, but its thorax is entirely, or only on the sides, of a blood-red. It is found in the south of Europe, in the Crimea, &c.

South America and the tropical countries of the eastern continent produce several others(1).

Other Longicornes of the same division, but in which the maxillary palpi, as usual, are at least as long as the labials, and extend beyond the extremity of the maxillæ, are distinguished from the following ones by their antennæ, which distinctly present twelve joints instead of eleven, at least in the males; they are always long and setaceous; and frequently spinous or bearded. The thorax is dentated or spinous on the sides. We will unite them in the subgenus

Acanthoptera, Lat.—*Callichroma*, *Purpuricenus*, *Stenocorus*, Dej. Dalm.

Certain species of America, in which the thorax is almost square or nearly cylindrical, and the elytra are most frequently terminated by one or two spines, form the *Stenocorus* of Dalman(2).

Others, but generally peculiar to the western countries of the eastern continent, in which the body is tolerably elevated, the thorax almost globular, and the antennæ are simple and without fasciculi of hairs, constitute the *Purpuricenus* of Ziegler and Dejean(3).

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(1) The *Cerambyx virens*, *albitarsus*, *nitens*, *micans*, *ater*, *festivus*, *vittatus*, *sericeus*, *elegans*, *suturalis*, *latipes*, *regius*, *albicornis*, &c., Fab.

Certain African species, such as the *Cerambyx longicornis*, *flavicornis*, and *claviger*, of Schœnherr, which, though very analogous at a first glance to the preceding, appear to form a separate subgenus by their compressed antennæ dilated near the end; but the mouth of the *Cerambyx sex-punctatus* of this same naturalist —*Saperda 6-punctata*, Fab.—which, from its analogy to the *Cerambyx clavicornis* —*Sap. clavicornis*, Fab.—of the same, appears to be congeneric, in the proportions of its palpi, resembles a Cerambyx properly so called.

The *Saperda hirsuticornis*, Fab.—Kirby, Lin. Trans., XII, p. 442—is a Callichroma by its mouth, it is true, but differs from it in the antennæ and the form of the body.

(2) Insect. Spec. Nov., p. 511, et seq.

(3) The *Cerambyx Kæhleri*, *Desfontainii*, Fab.;—*C. budensis*, Goeze. The *C. vinculatus* of M. Germar, which he refers to the Purpuriceni, is a Callichroma. M. Sahlberg, professor of Nat. History, has described and figured this last Insect under the name of *Cerambyx zonatus*, in a work entitled *Periculi Entomographici*,

Another species with a depressed body, and in which the third joint of the antennæ and the three following ones are terminated by a little bundle of hairs, approaches the Callichromæ, with which we formerly arranged it, in its general form and the musky odour it diffuses. It is the *A. alpina; Cerambyx alpinus*, L.; Oliv., Ib., 67, IX, 58; cinereous-blue; six blackish spots disposed longitudinally on each elytron, the two middle ones united and forming a band; a spot of the same colour on the anterior part of the thorax; superior part of the joints of the antennæ also black. Common in the Alps; it is sometimes taken in the timber yards at Paris.

The following Cerambycini have but eleven joints in the antennæ. In some, at least in the males, the antennæ are long and setaceous, the last joint of the palpi is obconical, the thorax is either almost square and slightly dilated in the middle, or oblong and nearly cylindrical—it is frequently rugose and tuberculated on the sides. They compose the subgenus

CERAMBYX proper.—CERAMBYX, Lin. Fab.

Certain species, with an unequal or rough thorax, usually spinous or tuberculated and dilated on the middle of its sides, with the third, fourth, and fifth joints of the antennæ, evidently thicker than the following ones, thickened and rounded at the end; and the latter abruptly longer and thinner, almost cylindrical, forming, with the preceding ones, an abrupt transition, have been generically distinguished by the name of *Hamaticerus*. The antennæ are much longer in the males than in the females.

C. heros, Fab.; Oliv., Ib., I, 1. Length one inch and a half; black; extremity of the elytra brown and prolonged into a small tooth at the suture; thorax extremely rugose and with a pointed or spiniform tubercle on each side; antennæ simple. Common in all the warm and temperate parts of Europe. The larva bores deep holes in the Oak, and is perhaps the Cossus of the ancients.

A species called the *militaris* by Bonnelli, very similar to the heros, but without the sutural tooth, and with antennæ proportionally shorter and more knotted, particularly in the female, is found in the departments of the south of France.

Species Insectorum nondum descriptas propositurі fasciculus, with four plates. He then figures various Cucurlionites forming new genera according to the system of M. Schœnherr. The descriptions are modelled on those of M. Gyllenhall, and are very complete.

The characters drawn from the antennæ are much less strongly marked in another species from the same country—the *cerdo*, L.—which is much smaller, narrower, entirely black, and without a tooth at the extremity of the elytra(1).

We refer to the same subgenus various species of Callichroma, Dej., with a smooth or but slightly unequal thorax, which is proportionally longer, and either of an oval shape and truncated at both ends or almost cylindrical. They are foreign to Europe; nearly all of them belong to South America and are of a small size. They are usually highly decorated, and some of them have one or two globular bundles of hairs on the antennæ. Some even present this singular appearance on their posterior feet. Fabricius and Olivier arranged some of these species among the Saperdæ. The thighs of these Insects are generally clavate and borne on a long pedicle, and their antennæ composed of long and slender joints(2).

We will also unite to the same subgenus of Cerambyx the *Gnomæ* of Count Dejean. Their thorax is much longer and cylindrical. The inner angle of the superior extremity of the joints of the antennæ is somewhat dilated. The palpi are almost filiform, and the inner side of the mandibles exhibits a tooth. Of the two species, he mentions one—*G. rugicollis*, Fab.—as peculiar to Carolina, and the other—*sanguinea*, Dej.—to Brazil.

Those Cerambycini in which the antennæ are hardly longer than the body, and rather filiform than setaceous; where the thorax, always unarmed, is sometimes almost globular or orbicular, and sometimes narrower, almost cylindrical and simply dilated and rounded in the middle; and where the palpi, always very short, terminate in a joint somewhat thicker and wider than the preceding ones, and in the form of a reversed triangle, constitute in the early works of Fabricius, and in the Entomology of Olivier, the genus

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(1) For the other species, see Dej., Catalogue, &c., p. 105. In some, foreign to Europe, the thorax is elongated and unarmed as in the Gnomæ. The *Cerambyx battus*, and some others with spinous or serrated antennæ, should form a particular division to be placed after the preceding one.

(2) The Callichromæ of Count Dejean—Catalogue—with the exception of the *alpina*, and probably the *globosa* also. Refer to it also the Callichromæ described by M. Germar in his Insect. Spec. Nov.; the *Callichroma scopiferum*, the *Cerambyx* of the Entom. Ind., of M. Klüg, and the *Saperda scobulicornis* of M. Kirby, Lin. Trans. The *Cerambyx perforatus*, and the *collaris* of Klüg, and the *Gnoma clavipes* of Fabricius, are remarkable for the length of the thorax, and approach the Gnomæ of Dejean.

CALLIDIUM,

Which is now divided into three.

Those species, in which the head is at least as wide as the thorax, and where the latter is almost cylindrical and simply dilated and rounded in the middle, compose the genus CERTALLUM of MM. Megerle and Dejean(1).

Those, in which the head is narrower than the thorax, elevated, and almost globular, form that of CLITUS, Fab.

Finally those, in which the thorax, also wider than the head, is flattened and orbicular, have retained the generic appellation of CALLIDIUM. A species of this division,

C. sanguineus; Cerambyx sanguineus, L.; Oliv., Ib., 70, 1, about five lines in length, black, with villous elytra and thorax of a fine sanguineous-red, is very common in the wood-yards and even houses of Paris, in the spring. The

C. arcuatus; Leptura arcuata, L.; Oliv., Ib., 70, ii, 16, which is about half an inch long, of a deep black, with two bands on the thorax, three arcuated streaks on the elytra, and some points on their base and extremity of a golden-yellow, is a Clitus. This insect also is very common.

We will terminate this tribe with Insects, which, in relation to their palpi, form of their head, thorax and elytra, as well as in their proportions, present remarkable exceptions or anomalies.

We will commence with those in which the form of the thorax is very analogous to that of the preceding ones, and particularly of the Certalla. It is equal in width to the head, and to the base of the elytra, or scarcely narrower, and either almost cylindrical, or rounded, or nearly orbicular, and wider near the middle in both cases. The last joint of the palpi is sometimes attenuated near the end and terminated in a point, and sometimes truncated, thicker, and obconical, at the same extremity. All the thighs are clavate, and supported by an abrupt, slender and elongated pedicle. The elytra of the greater number are either very short or abruptly narrowed at but little distance from their base, and then become subulate.

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(1) *Callidium ruficolle*, Fab.;—*C. fugax*, ejusd.; *Callidium setigerum*, Germ.

In the first place we have those in which no such dissimilitudes are to be found, their forms and relative proportions being always the same as those of the elytra of the preceding Insects.

The first genus

Obrium, Meg. Dej.—*Callidium*, *Saperda*, Fab.

Is characterized as follows: the head rounded, and not prolonged anteriorly in the manner of a snout; palpi filiform, the last joint terminating in a point; antennæ long and setaceous; thorax long, narrow, almost cylindrical, or forming a truncated oval(1).

The second genus

Rhinotragus, Dalm.(2)

Differs from the preceding one in the head, which is narrowed and prolonged anteriorly in the manner of a snout; in the palpi of which the last joint is rather thicker than the preceding ones, and truncated at the end; in the antennæ, shorter than the body, slightly dilated and somewhat serrated at the extremity; and in the almost orbicular thorax.

These Insects are evidently allied to those of the following genus; the

Necydalis, Lin.

The only one of this tribe in which the elytra are either very short, and squamiform, or prolonged, as usual, to the extremity of the abdomen, but abruptly contracted a little beyond their origin, then much narrowed, and terminating in a point, or subulate. This is the only point in which these last mentioned Insects resemble the Œdemeræ, with which Fabricius has arranged them. The last joint of the palpi is a little longer, and almost obconical and compressed. Their abdomen is long, narrow, contracted, and as if pediculated at base. The wings are folded at their extremity.

Those species in which the elytra are subulate will form a first subgenus,

Stenopterus, Illig.

From which we might separate various species, foreign to Europe, with shorter antennæ, thickest, and almost serrated at the extremity(1).

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(1) See Catalogue, &c., of Count Dejean, p. 110.

(2) Dalm., Insect. Spec. Nov., p. 513. We may also refer to it the Stenopteri *luridus*, *punctatus*, *albicans*, of the Entom. Bras. of Klüg.

In those that inhabit France, such as the

N. rufa, L.; or the *Lepture à étuis étranglés*, Geoff.; Ib., 74, i, 6, the antennæ are filiform and as long as the body(2).

Those in which the elytra are short and squamiform will constitute the subgenus

NECYDALIS proper,

Which corresponds to the genus *Molorchus* of Fabricius. Its type is the *Necydalis major* of Linnæus and Geoffroy—Oliv. Ib. I, 1. Found in old Willows in June and July(3).

Certain Insects generally proper to the African islands, New Holland, New Ireland and New Zealand, ambiguous in several respects, and which, in a natural order, should perhaps be placed between the Lamiariæ and the Lepturetæ, will terminate the division of the Cerambycini.

Their palpi are almost filiform, the last joint almost cylindrical and somewhat attenuated towards the base; their thorax is usually smooth or but slightly uneven, without acute tubercles, and becomes widened posteriorly, or presents the form of a trapezium or truncated cone, as in the last tribe of this family; the abdomen in the greater number is almost in the form of a reversed triangle, and the elytra are truncated at the extremity.

These Insects form four genera.

DISTICHOCERA, Kirby.

Where the antennæ of the males are gradually dilated towards the extremity, and their joints, from the third, are forked or divided into two branches at the end(4).

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(1) See the Entom. Bras., Klüg.

(2) The Necydales *atra* and *præusta*, Fab., and the *N. femorata* of Germar, are analogous.

(3) See Fabricius, Olivier, Klüg, Kirby, and Schœnherr.

The *Stenocorus hemipterus* of Fabricius, which should apparently be placed here in a natural order, approximates more closely to the Stenocori of Germar and Dejean.

(4) Kirby, Lin. Trans., XII, xxiii, 10.

TMESISTERNUS, Lat.

Where the antennæ are simple, setaceous, and longer than the body; the thorax is lobate posteriorly, and the præsternum prolonged behind, truncated, and received into the emargination of the mesosternum(1).

TRAGOCERUS, Dej.

Where there is no præsternal projection; the antennæ are filiform, a little shorter than the body and somewhat serrated; the thorax is unequal, slightly sinuous laterally, and the elytra form a large square(2).

LEPTOCERA, Dej.

Where the præsternal projection is also wanting; but the antennæ are setaceous and much longer than the males; the thorax is smooth and in the form of a truncated cone, and the abdomen and the elytra are almost triangular(3).

The Longicornes of our third tribe, that of the LAMIARIÆ, are distinguished by their vertical head, and by their palpi, which are filiform or hardly larger at the extremity, and terminated by a joint more or less ovoid and tapering to a point. The outer lobe of the maxillæ is slightly narrowed at the end, and curved on the inner division. The antennæ are most frequently setaceous and simple, and the thorax, exclusive of the lateral tubercles or spines, is nearly of an equal width throughout. Some species are apterous, a character exhibited by no other division of this family.

This tribe is composed of the genera *Lamia* and *Saperda* of Fabricius, of some of his Stenocori, and of the Colobotheæ of Count Dejean, as well as several of his Cerambyces; but I have not yet succeeded in detecting characters which clearly separate the first of these genera from the following one.

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(1) Undescribed Insects from New Holland which are closely related to the Callidia *variegatum*, *lineatum*, and *sulcatum*, Fab.

(2) Dej., Catal., iii.

(3) *Cerambyx scriptus*, L., Isle of France. For these genera, see the Trans. Lin. Soc., and Donovan's work on New Holland Insects.

The *Cerambyx longimanus* of Linnæus and Fabricius belongs neither to this genus nor to that of Prionus, in which it was first placed, but forms a separate one—and such was the opinion of Illiger and Thunberg—of the tribe of the Lamiariæ. It is the

ACROCINUS, Illig.—*Macropus*, Thunb.

It is distinguished from all the Longicornes by the thorax, each side of which is terminated by a movable tubercle, terminating in a point, or by a spine. The body is flattened, and the thorax transversal; the antennæ are long and slender, and the anterior legs longer than the others; the elytra are truncated at the end and terminated by two teeth, the exterior of which is the strongest.

A. longimanus; Cerambyx longimanus, L.; Oliv., Col. IV, 66, iii, iv, 12, known by the vulgar name of the *Cayenne Harlequin*. The thighs and tibiæ of the two anterior legs are very long and slender. The movable tubercles of the thorax are terminated by a strong spine, and the elytra are beautifully variegated with grey, red, and black(1).

All the remaining Lamiariæ compose but the single genus

LAMIA,

Which we will separate into two sections: those in which the sides of the thorax are sometimes tuberculous or rugose and sometimes spinous, and those in which it is smooth and cylindrical.

The first are divided into those that are furnished with wings, and those which are apterous.

The genus ACANTHOCINUS, Meg. Dej., is formed of a great number of species, mostly from South America, in which the body is proportionally shorter, wider, depressed, or but slightly elevated, and the abdomen almost square and hardly longer than it is wide. The legs are robust, and the tarsi strongly dilated.

There are several species in Europe, one of which, the

L. ædilis, Fab., brown, with a greyish down, four yellow dots on the thorax, and two blackish bands on the elytra, is remarkable for the length of the antennæ of the male, which is quadruple that of the body(2).

Next to the Acanthocini should come the genus TAPEINA of Messrs Lepeletier and Serville—Encyc. Méthod., X, 545. The antennæ of the males are inserted into a posterior extremity of a long appendage which arises from the lateral margin of the forehead, extends transversely, and covers the eyes.

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(1) Add *Prionus accentifer*, Olivier.

(2) For the other species see Catalogue, &c., Dej., p. 106.

All the species known are from Brazil.

Others of a very similar form, with antennæ either bearded or furnished with bundles of hairs, constitute the genus Pogonocherus, Meg. Dej.

Some of the species inhabit Europe, and nearly all of these are remarkable for their elytra, which are truncated obliquely at the extremity(1).

Others again, still slightly elongated, but with a more cylindrical body, have each eye completely divided into two parts by the tubercle which gives rise to the antennæ—they compose the genus Tetraopes(2).

Certain Lamiæ of Fabricius, with a narrow and elongated body, very long antennæ, and a stout spine on each side of the thorax, in which the anterior tibiæ are slightly curved, and the intermediate ones are furnished with a tooth on the outer side, form that of the Monochamus, Dej.—*Monochammus*, Dahl., Catal.; as those gentlemen have not indicated its characters, I only give the above for such as I presume them to be(3).

In the "Catalogue de la Collection des Coléoptères" of Count Dejean, with the exception of the apterous species, the remaining Lamiæ of Fabricius retain the generic appellation of Lamia; but it appears from another Catalogue, that of Dahl, that two species from France—*cucurlionides*, *nebulosa*—have been separated by M. Megerle to form another generic section, or Mesosa(4); if we suppose that the Saperdæ differ from the Lamiæ in the absence of lateral points on the thorax, these species, in this respect, would approach the Saperdæ; but their body is proportionally shorter and wider than that of these last Insects, and by this character they are more nearly allied to the Lamiæ. Of these two species, that called

L. cucurlionides, Fab.; Oliv., Ib., IV, 67, x, 69, is one of the prettiest that is found in France. It is about six lines in length, brown, with round, black, villous spots surrounded by a ferruginous circle, which induced Geoffroy to term it the *Lepture aux yeux de paon.*

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(1) Ibid., 107.

(2) See Schœnh., Synon. Insect., and the Catal., Dej. The *Cerambyx maxillosus*, and *nigripes* of Olivier appear to approach these Insects.

(3) See Dej., Catal., p. 106.

(4) Another might have been formed with the *Lamia hystrix*, Fab., whose antennæ are pectinated. There are some such as the L. *5-fasciata*, *3-fasciata*, *capensis*, &c., in which the sides of the thorax are rather rugose or plicated, than furnished with spines. Others, such as the species called the *pulchra*, *regalis*, *imperialis*, *oculator*, are rather more shortened and widened.

L. textor; Cerambyx textor, L.; Oliv., Ib., vi, 39. Another species very common in Europe, but its thorax is armed on each side with a pointed tubercle. It is an inch long, of an obscure black, with short antennæ and granulated elytra. This Insect, with some others, evidently leads to the apterous species, all peculiar to Europe and those parts of Asia which border on it, and of which the larvæ probably feed on the roots of plants. These species form the genus Dorcadion of Dalman, which is adopted by most entomologists. The antennæ are generally shorter than the body, and are composed of obconical joints, which give them a nodulous appearance; their abdomen is a sort of oval, or almost triangular.

M. Megerle has formed the genus Parmena, with certain small species that appear to me to be removed from the others only by the antennæ, which are longer than the body, and as their joints are more elongated, they become rather cylindrical than conical. According to this, we would be obliged to connect others with them, much larger, but presenting the same characters, such as the *tristis, lugubris,* and *funesta.*

Among those with short antennæ, or the *Dorcadions* properly so called, there is one very common in Europe, but almost exclusively confined to calcareous localities, or to such as border on that kind of soil called the *L. fuliginator; Cerambyx fuliginator,* L.; Oliv., Ib. X, 21. It is about six lines in length; black; elytra sometimes cinereous, and sometimes blackish-brown, each, in both cases, presenting three white lines, one along the suture, a second along the exterior margin, and a third between the two first, but not extending to their posterior extremity. Several other species are found in Germany and the south of Russia(1).

In the other Lamiariæ, the thorax is destitute of lateral tubercles or spines, and is cylindrical; the body is always elongated, and in some almost linear. They compose the genus

SAPERDA, Fab.

That which he calls *Gnoma*, restricting it to certain species from Java, Sumatra, New Holland, &c. in the direction of the head, and in the parts of the mouth, resembles the Lamiæ; but the thorax is as long as the abdomen, cylindrical, somewhat narrower in the middle, and destitute of spines and tubercles. The antennæ are longer than the body and are sometimes furnished with bundles of hairs. The anterior feet are elongated(1).

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(1) See Schœnh., Synon. Insect., I, 3, p. 307; and the Catalogue, &c., of Count Dejean, both for this genus and Parmena.

Count Dejean has detached from the Saperdæ the genera ADESMUS, APOMECYNA, and COLOBOTHEA.

The *Adesmi*(2) only differ from the ordinary Saperdæ, in the first and third joint of the antennæ, which are, proportionally, much more elongated; the length of these two joints, added to that of the intermediate one or the second, constitutes more than a third of the total length of the antennæ.

The *Apomecynæ*(3) have a cylindrical body; the antennæ are filiform, short, terminated by an acute point, and with the third and fourth joint very long, and the following ones extremely short. These species are peculiar to the East Indies and the Isle of France. They are closely allied to the true Lamiæ, and Fabricius places one of them, the ***histrio***, in that genus.

The *Colobotheæ*, which include the major part of his Stenocori, have their antennæ closely approximated at their insertion, the body compressed, and as if carinated laterally, and the elytra emarginated or truncated at the end, with the exterior angle prolonged in the manner of a tooth or spine. The thighs are clavate and pediculated. The face forms a long square. These Insects are peculiar to South America and to the most eastern islands of Asia that are situated in the vicinity of the equator(4).

Other Saperdæ, and all from Brazil, in which the thorax is as wide as the elytra, or scarcely narrower; in which the third and fourth joints of the antennæ, or at least the preceding one, are much elongated or dilated, and furnished with hairs, and the last ones are abruptly shorter; and where the elytra are widened and rounded at the end, form another division(5).

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(1) The species named *longicollis, giraffa, cylindricollis*, and some others not yet described.

(2) See Dej., Catalogue, &c., p. 108.

(3) Ibid.

(4) Ibid. The *Stenocorus pictus*,—Oliv., Saperde, 68, iv, 40,—*annulatus* of Fabricius. His *Saperda acuminata* appears to belong to the same genus, as well as the Insect figured by Olivier among the Cerambyces, pl. xvi, 117, although its thorax is bi-spinous.

(5) Such are the *Saperda amicta, togata, palliata, dascyera, ciliaris*, of the Entom. Bras., Klüg. The genus *Thyrsia* of Dalman—Anal. Entom., p. 171, vol. III—approximates in some respects to these species, but in others seems to approach the last of our Prionii.

Several Saperdæ, with an always long and narrow body, on account of their antennæ, which are composed of twelve joints and not of eleven, should also form a particular subgenus(1).

Of those species considered by all the entomologists of the day as Saperdæ properly so called, we will cite the two following:

S. carcharias; *Cerambyx carcharias*, L.; Oliv., Ib., 68, ii, 22. An inch long, covered with a cinereous-yellow down punctured with black, and the antennæ picked in with black and grey.

Its larva lives in the trunk of the Poplar, and sometimes destroys young plantations of that kind of tree.

S. linearis; *Cerambyx linearis*, L.; Oliv., Ib., ii, 13. About six lines long; very narrow, linear; black; legs short and yellow; elytra punctured in lines and truncated at the extremity. Its larva inhabits the Hazel-tree.

Other species have been described in which the body is still narrower, and the antennæ are excessively long and almost as slender as a hair(2).

In the fourth and last tribe, that of the Lepturetæ, we find Longicornes in which the eyes are rounded, entire, or scarcely emarginated, and where, in this case, the antennæ are inserted before, or at most at the anterior extremity of this slight emargination. The head is always inclined posteriorly behind the eyes in several, or abruptly narrowed at its junction with the thorax, in the manner of a neck; the thorax is conical or trapezoidal and narrowed before. The elytra become gradually narrower.

This tribe forms the genus

Leptura(3), Lin.,

With the exception of certain species which belong to the pre-

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(1) The *Saperda cardui*, *asphodeli*, *suturalis*, &c. In some of the preceding species the eleventh and last joint is somewhat abruptly attenuated, but without being really divided into two.

(2) See Fabricius, Olivier, Schœnherr, and the Catalogue, &c., of Count Dejean.

(3) Or the *Stenocorus* of the first edition of the Règne Animal, a denomination which I have thought it best to suppress, on account of the confusion resulting from the different applications that have been made of it.

N.B. Messrs Lepeletier and Serville—Encyc. Méthod., X, 687—have placed in this tribe a genus established by them under the name of Euryptera, which ceding tribes and to the Donaciæ. Thus modified, this genus corresponds to the *Stenocorus* of Geoffroy and the *Rhagium* and *Leptura* of Fabricius.

Sometimes the head is elongated posteriorly, immediately behind the eyes. The antennæ, frequently shorter than the body, are approximated at base, and inserted beyond the eyes, on two little eminences in the form of tubercles, and separated by an impressed line. The thorax is generally tuberculous or spinous on the sides.

Here, the palpi are filiform; the last joint of the maxillaries is almost cylindrical, and the same of the labials ovoid; the third and two following ones of the antennæ are dilated at their external angle, and are curved and silky, particularly in the males. Such are those which constitute the

DESMOCERUS, Dej.

The thorax is in the form of a trapezium, without tubercles or points on the sides; its posterior angles are extremely pointed. The maxillæ and labium appeared to me to resemble those of the Lamiæ.

But a single species, well represented with all its details by Knoch, is known. It inhabits North America(1).

There, the palpi are inflated at the extremity, and terminated by a joint in the form of a reversed cone or triangle. The antennæ are regular, glabrous, or simply pubescent.

Some are removed from the others by the fact that their males alone are furnished with wings. Their thorax is conical and smooth, without spines or tubercles. They compose the genus

VESPERUS, Dej.—*Stenocorus*, Fab. Oliv.

Their head is large and placed on a kind of rotula. The antennæ are long and slightly serrated, with the first joint shorter than the third. The last joint of the palpi is almost triangular. The eyes are oval and slightly emarginated. The elytra of the females are short, soft and gaping(2).

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should be distinguished from all those of this division of the Longicornes, by the number of joints in the antennæ, amounting to twelve instead of eleven. Its type is an Insect of Brazil which is unknown to us.

(1) *Stenocorus cyaneus*, Fab.; Knoch, N. Beyt., I, p. 148, vi, i; *Rhagium cyaneum*, Schœnherr.

(2) *Stenocorus strepens*, Oliv., Col., IV, 69, I, i, b; *S. luridus*, Ross., Faun. Etrusc. Mant., II, App. p. 96, tom. III, fig. 1.

In the following Insects, and of the same subdivision, both sexes are furnished with wings, the thorax is tuberculous or spinous laterally, unequal and as if turned up at the two extremities. They compose the genus *Rhagium* of Fabricius or *Stenocorus* of Olivier, including also some of the Lepturetæ of the former. Later entomologists have thought it best to divide these Insects into five genera, which may be reduced to four.

Rhagium, Dahl.

Or Rhagium properly so called, where the antennæ, always simple, are at most half as long as the body, and where the last joint of the palpi forms a triangular club. The head is large, and almost square; the eyes are entire. Each side of the thorax offers a conical spiniform tubercle(1).

Rhamnusium, Meg.

Where the antennæ, somewhat shorter than the body, are serrated, with the third and fourth joints shorter than the following ones. The eyes are evidently emarginated(2).

Toxotus, Pachyta, Meg. Dej.

Where the antennæ are at least as long as the body, simple, and with the first joint much shorter than the head; the eyes are entire or but very slightly emarginated. The abdomen is triangular, or forms a long square, narrowed posteriorly(3).

Stenoderus(4), Dej.—*Cerambyx*, Fab.—*Leptura*, Kirb.—*Stenocorus*, Oliv.

Where the antennæ are also long, but their first joint is at least as long as the head; their body is long, narrow and almost linear. The palpi also are more salient. The eyes are entire(1).

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(1) The *Rhag. bifasciatum*, *indagator*, *inquisitor*, *mordax*, Fab.

(2) *Rhagium salicis*, Fab.

(3) See the Catal., of Dejean and Dahl. In the *Leptura virginea* and *collaris* of Fabricius, which I refer to the subgenus Toxotus, the third and fourth joints of the antennæ are rather shorter than the fifth.

(4) Near the subgenus Stenoderus come Distenia and Cometes, two genera established by Messrs Lepeletier and Serville, Encyc. Méthod., X, 485. Their thorax is tuberculous or spinous laterally, which removes them from Stenoderus, where the palpi are also shorter, and the antennæ simply furnished with a dense pubescence, and not pilose as in these two subgenera. The elytra of the Disteniæ are gradually narrowed from their humeral angles to their extremity, which is armed with a spine; they are linear and unarmed in Cometes. The species of both subgenera are from Brazil.

Sometimes the head is abruptly narrowed immediately behind the eyes. The antennæ, inserted near the anterior extremity of their internal emargination, are remote at base. The two eminences from which they rise are almost confounded in one plane. The thorax is almost always smooth or without lateral tubercles. They are the

LEPTURA, Dej. Dahl.

Or Leptura properly so called.

In some the thorax is almost plane above, and trapezoidal or conical. Of this number are

L. armata, Gyll.; *L. calcarata*, Fab., the male; *L. subspinosa*, ejusd., the female; which is very common in summer in the woods, on the flowers of the Bramble. The body is elongated and black, the elytra are yellow with four transverse black lines, the anterior of which is formed by points. The antennæ are picked in with black and yellow. The posterior tibiæ of the male are armed with two teeth.

L. nigra, L.; Oliv., Col., 73, III, 36. Black and glossy, with a red abdomen.

In others, the thorax is much more elevated and rounded, or almost globular. Such is

L. tomentosa, Fab.; Oliv., Ib., II, 13. Black, with a yellowish pubescence on the thorax; elytra of this same colour, and the extremity black and truncated. Very common in the environs of Paris(2).

FAMILY V.

EUPODA.

Our fifth family of the tetramerous Coleoptera is composed of Insects, the first of which so closely approach the last Longicornes that they were confounded both by Linnæus and Geoffroy, and the last are so closely allied to the Chrysomelæ, the type of the following family, that the first of those naturalists places them in that genus. The organs of manducation present the same affinities; thus in the first, the ligula is membranous, bifid or bilobate, as in the Longicornes; their maxillæ also greatly resemble those of these latter; but in the last this ligula is almost square or rounded, and analogous to that of the Cyclica.

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(1) *Leptura ceramboides*, Kirby, Lin. Trans., XII, xxiii, 11, and some other species from Brazil.

(2) See the species called *rubra*, *virens*, *hastata*, *2-punctata*, *scutellata*, &c., and as regards the genus, the Catalogues already quoted, the last volume of Gyllenhall's Insect. Suec., and Olivier, Fabricius, &c.

The maxillary lobes, however, are membranous, or but slightly coriaceous, whitish or yellowish; the external one is widened near the extremity and does not present the figure of a palpus, characters which give these parts more resemblance to those of the Longicornes than to those of the Cyclica. The body is more or less oblong, and the head and thorax are narrower than the abdomen; the antennæ are filiform, or gradually enlarge towards the extremity and are inserted before the eyes, which, in some, are entire, round, and tolerably prominent; and, in others, are slightly emarginated. The head is received posteriorly into the thorax, which is cylindrical or forms a transverse square. The abdomen is large, compared to the other joints of the body, and forms a long square or an elongated triangle. The joints of the tarsi, with the exception of the last, are furnished with pellets beneath, and the penultimate is bifid or bilobate. The posterior thighs are strongly inflated in a great many, and hence the denomination of the family.

All these Insects have wings, and are found on the stems or leaves of various plants, but, so far as regards a great number of species that inhabit France, on those of the Liliaceæ particularly. The larvæ of some—the Donaciæ—attack the internal part of the roots of aquatic plants, on which we find the perfect Insect. Those of several others live exposed, but they cover themselves with their excrements which they form with a sort of case or scabbard, like that of the Cassidæ.

We will divide this family into two tribes:

The first, that of the SAGRIDES, is composed, as its name indicates, of the genus

SAGRA.

The mandibles terminate in a sharp point. The ligula is profoundly emarginate or bilobate.

In some, the palpi are filiform, the eyes emarginated, the posterior thighs very stout, and the tibiæ arcuated.

MEGALOPUS, Fab.

The anterior extremity of the head projecting in the manner of a snout; strong and crossed mandibles; the palpi terminated by an elongated and very pointed joint; the ligula deeply cleft into two elongated lobes; the body short, with a transversal, square, or trapezoidal thorax. The antennæ gradually enlarge towards the extremity, or are terminated by an elongated club; their third joint is longer than the second and fourth, and the four posterior legs are long, slender, and arcuated.

These Insects are peculiar to South America(1). The

SAGRA, Fab.

Or Sagræ properly so called, originally designated by the name of *Alurnæ*, are exclusively confined to certain parts of southern Africa, Ceylon and China. Their palpi are terminated by an ovoid joint, the divisions of the ligula are short, the thorax is cylindrical, the antennæ are almost filiform, longer than the head and thorax, with their inferior joints shorter than the others, and the four anterior tibiæ tolerably thick, but slightly elongated, angular and straight. These Insects have a uniform but very brilliant colour, green, golden, or a fulgid-red, with a slight mixture of violet(2).

In the others, the palpi are thicker at the extremity, the eyes are entire, and the thighs of nearly equal thickness. The body is almost always elongated, narrow, slightly depressed or but little elevated, and the thorax narrowed posteriorly, and almost always cordiform.

ORSODACNA, Lat. Oliv.—*Crioceris*, Fab.

Where the antennæ are filiform and composed of obconical joints, where the last joint of the palpi is merely a little larger than the preceding ones, and nearly forms a truncated ovoid, and where the thorax is at least as long as it is wide(1).

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(1) Besides Fabricius, Latreille, Olivier, Germar, and Dalman, see the excellent Monograph of this genus, published by M. Klüg, and the observation on this genus by Count Mannerheim, who, to the figures of certain species, has added some very good ones of the parts of the mouth.

(2) See Fab., and Oliv., V, 90.

PSAMMŒCUS, Boudier.—*Anthicus*, Fab.—*Latridius*, Dej.

Where the antennæ, composed of short and crowded joints, gradually enlarge, and where the maxillary palpi are abruptly terminated by a stout triangular club. The thorax is wider than it is long. The body is more depressed than in the preceding species, the antennæ are shorter and the eyes less prominent(2).

The second tribe, or that of the CRIOCERIDES, is distinguished from the preceding by the mandibles, the extremity of which is truncated or presents two or three teeth, and by the ligula, which is entire or but slightly emarginated.

It is composed of the genus

CRIOCERIS, Geoff.—*Chrysomela*, Lin.

Which we will divide as follows:

Sometimes the mandibles taper to a point and present two or three teeth at that extremity. The palpi are filiform. The antennæ, of an ordinary thickness, are almost granose in some, and in others are mostly composed of obconical joints, or such as are evidently thicker at their superior extremity.

DONACIA, Fab.—*Leptura*, Lin.

Where the posterior thighs are large and inflated; the antennæ are of equal thickness throughout and their joints are elongated; the eyes are entire, and the last joint of the tarsi is enclosed for most of its length between the lobes of the preceding one.

These Insects are frequently ornamented with brilliant colours, bronzed or gilded. Several are likewise covered with an extremely fine and silky down, which may prove useful to them when they happen to fall into water, as they live on aquatic plants such as the Iris, Sagittaria, Nymphœa, &c., to which they cling with great tenacity. Their larvæ live in the roots of the same plants. Their chrysalides, according to the observations of M. A. Brongniart, are attached to their filaments by one edge only, forming knots or bulbs.

The anatomical researches of M. Leon Dufour have induced him to think that the Donaciæ should form a particular family. Their hepatic vessels, in number, arrangement, form and structure, constitute a very remarkable exception to those of the Tetramera, and one which even appears to be peculiar to these Insects. These vessels only open into the chylific ventricle, while in all the other Tetramera dissected by this able anatomist, they have two insertions, one ventricular and the other cæcal. These biliary ducts, only four in number, are of two different kinds; those of the first are capillary, disposed in two strongly flexed curves, and are inserted by four distinct ends into a short obround vesicle, situated at the inferior and somewhat lateral extremity of the chylific ventricle; the others, much shorter, thicker, more dilatable, thin and tapering at both ends, have one extremity free, and are separately inserted by the other into the superior and dorsal region of that organ. The whitish pulp contained in them is considered by M. Dufour as alimentary matter. The esophagus is capillary and without any dilatation in the form of a crop. The chylific ventricle is roughened with very salient papillæ. The testes are very similar to those of the Lepturæ. The larvæ are naked and concealed, as well as those of the last Longicornes, an observation which strengthens the conjectures of M. Dufour.

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(1) See Lat., Gener. Crust. et Insect., III, p. 45, and I, xi, 5; Oliv., Col., VI, 98, bis, and Gyll., Insect. Suec. III, 642.

(2) *Anthicus 2-punctatus*, Fab.; I place this genus here with some hesitation.

HÆMONIA, Meg. Dej.

The Hæmoniæ are Donaciæ in which the penultimate joint of the tarsi is very small, in the form of a knot, almost entire; the last is very long(1). The

PETAURISTES, Lat.

United by Fabricius with the Lemæ or our Crioceres properly so called, also have very stout posterior thighs; but the eyes are emarginated; the antennæ, as in the latter, are generally composed of shorter joints, and the lobes of the penultimate joint of the tarsi are much less elongated and merely clasp the root of the following one(2).

CRIOCERIS, Geoff. Oliv.—*Lema*, Fab.—*Chrysomela*, Lin.

Or Crioceres properly so called, are removed from the preceding by this character: their posterior legs are similar to the others, or differ from them but very slightly; the antennæ become somewhat and gradually enlarged towards the extremity, and are almost granose, their joints not being much longer than they are wide. The eyes are prominent and emarginated. The posterior extremity of the head forms a sort of neck behind these latter organs.

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(1) The *D. equiseti*, *zosteræ*, Fab.

(2) The *Lema varia*, *posticata*, Fab.

These Insects live on the Liliaceæ, Aspargi, &c., and like those of the preceding family, make a slight noise when seized. Their larvæ feed on the same plants to which they cling by means of their six squamous feet. Their body is soft, short and inflated; their own fæces, with which they cover their back, protect them from the action of the sun and changes of weather. In order that they may accomplish this, their arms are placed above. When about to become nymphs they enter the ground. The

C. merdigera; Chrysomela merdigera, L.; Oliv., Col., VI, 94, i, 8, is three lines in length, with the thorax and elytra of a beautiful red. The thorax is strangulated on each side. The elytra are marked with longitudinal lines of punctures. In all Europe on the white Lily.

M. Boudier, of Versailles, a zealous entomologist, to whom I am indebted for several rare and curious species, has published in the Memoires de la Société Linneenne de Paris, some observations on the *C. brunnea*—*Lema brunnea*, Fab.,—which is fulvous, with the antennæ, pectus and base of the abdomen black. It is found together with its larva on the *Lilium convallaria*.

C. asparagi; Chrysomela asparagi, L.; Oliv., Ib., II, 28. Bluish, with a red thorax, sometimes immaculate, and sometimes with a blue and cordiform spot in its middle; the elytra are yellowish, with a blue band along the suture, which, being united with three lateral spots of the same colour, forms a cross.

The same plant is devastated by another species—the *C. 12-punctata*, L.—which is fulvous, with six black spots on each elytron(1).

Auchenia, Thunb.

The Aucheniæ differ from the Crioceres, with which they were at first confounded, by their entire eyes; by their palpi narrowed and terminated in a point, and not obtuse; by the last seven joints of their antennæ which are wider; and by their thorax, which is dilated near the middle of each side into an angle or tooth(1).

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(1) See Olivier and Fabricius, but without including the leaping species, some of which belong to the subgenus *Petauristes*, and the others to the last one of this family, or *Megascelis*.

Sometimes the mandibles are truncated; the palpi are terminated by a strongly inflated truncated joint, with a little annular prolongation, presenting the appearance of another joint. The antennæ are slender, and consist of highly elongated and almost cylindrical joints.

MEGASCELIS, Dej. Lat.

The eyes are somewhat emarginated. The mandibles are thick. The exterior maxillary lobe is narrow, cylindrical and curved inwards. The labial palpi are almost as large as those of the maxillæ. These Insects, which are peculiar to South America, appear, in some respects, to approach *Colapsis*, but their general form places them among the Eupoda(2).

FAMILY VI.

CYCLICA.

In our sixth family of the Tetramera, where the three first joints of the tarsi are still spongy, or furnished with pellets beneath with the penultimate divided into two lobes, and where the antennæ are filiform or somewhat thicker towards the end, we observe a body usually rounded, and in those few where it is oblong, with the base of the thorax of the width of the elytra and maxillæ, whose exterior division, by its narrow, almost cylindrical form and darker colour, has the appearance of a palpus; the interior division is broader and destitute of the little squamous nail. The ligula is almost square or oval, entire or widely emarginated.

From the various anatomical researches of M. Leon Dufour, it appears that the alimentary canal is at least thrice the length of the body: that the esophagus is most usually inflated behind the crop, and that the chylific ventricle or stomach is commonly smooth, at least throughout a great part of its extent. The biliary apparatus resembles that of the Longicornes in the number and double insertion of the vessels which compose it; they amount to six, two of which, those of the Cassidæ excepted, are generally slenderer and shorter. Each testis is formed by a single capsule.

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(1) *Crioceris subspinosa*, Fab.

(2) The *Lema vittata*, *cuprea*, *nitidula*, Fab.

All the larvæ known to us are furnished with six feet, have a soft, coloured body, and feed, as well as the perfect Insect, on the leaves of vegetables to which they usually attach themselves by means of a viscid or adhesive humour. There also many of them become nymphs, at the posterior extremity of which is found the last exuviæ of the larva folded into a pellet. These chrysalides are frequently of various colours. Some of the larvæ penetrate into the earth.

These Insects are generally small, and are frequently ornamented with brilliant and metallic colours; their body is smooth or destitute of hairs. They are mostly slow and timid, letting themselves fall to the ground the moment we attempt to seize them, or folding their antennæ and feet close to their body. Several species are good jumpers. The females are extremely prolific.

If we take into consideration the different habits of their larvæ, we will find that the Cyclica are divided into four principal sections:

1. Larvæ covering their bodies with their excrement.
2. Larvæ inhabiting tubes which they drag about with them.
3. Naked larvæ.
4. Larvæ concealed in the interior of leaves, and feeding on their parenchyma: the *Leaping Cyclica*.

Such are the principles on which we have proceeded in the arrangement of this family. We divide it into three tribes, according to the mode in which the antennæ are inserted.

In the first, or the CASSIDARIÆ, the antennæ are inserted in the superior part of the head, and are approximated, straight, short, filiform and almost cylindrical, or gradually enlarged towards the extremity. The mouth, altogether underneath, and with short and almost filiform palpi, is sometimes arched (cintree), and sometimes partly received into the cavity of the præsternum. The eyes are ovoid or round. The legs are contractile and short, and the tarsi flattened; the lobes of the penultimate joint completely enclose the last.

The body being flat above, these Insects, owing to the disposition of their tarsi, are enabled to glue themselves to the surface of leaves and to remain there without motion; besides this, the body is most commonly orbicular or oval, and overlapped all round by the thorax and elytra. The head is concealed under the thorax, or received into its anterior emargination. Their colours are various and are prettily distributed in the form of spots, points, and streaks. Such of their larvæ as are known to us cover themselves with their fæces.

The Cassidariæ are composed of two genera. In the first, or

HISPA, Lin.

The body is oblong, the head is entirely exposed and free, and the thorax forms a trapezium. The mandibles have but two or three teeth; the exterior maxillary lobe is shorter than the inner one; the antennæ are filiform and pectinated anteriorly.

ALURNUS, Fab.

The Alurni, which Olivier does not distinguish from his Hispæ, appear to differ from them only in the form of their mandibles, the superior extremity of which is prolonged into a stout and pointed tooth, and which, besides, exhibits a second but very short one on the inner side.

The ligula is corneous.

This subgenus comprises the largest species, most of which are peculiar to Guiana and Brazil. Among them is the

Hispe bordée, Règn. Anim. Ed. I, pl. xiij, f. 5. Blood-red; antennæ, thorax, the sides excepted, and elytra, black; suture and external margin of the elytra, colour of the body; their middle is marked, in a variety, by a transverse line also red. This Insect is not rare in Brazil(1).

HISPA, Lin, Fab.

The Hispæ, properly so called, have short mandibles terminated by two or three small and almost equal teeth. America produces a great number of species. In some the superior surface of the body and even a portion of the antennæ are densely spinous. Such is the

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(1) See Fabricius and Olivier, Col., VI, 95, 1, 2.

H. atra, L.; Oliv., Col., VI, 95, I, 9, called by Geoffroy the *Chataigne noire*. It is entirely black, extremely spinous, and a line and a half in length. In the environs of Paris, on the Grasses.

The southern departments of France produce another species —the *testacea*, Oliv., Ib., 1, 7—closely allied to the preceding one, but fulvous. It is found on the Cisti.

Chalepus, Thunb.

The Chalepi, if we take the *H. spinipes* of Fabricius as their type, differ from the Hispæ proper in their long, slender and arcuated legs, the two anterior of which are armed on the inner side, in the males, with a long spine. The third joint of the antennæ is also proportionally longer.

Some other Hispæ—*monoceros*, Oliv.; *porrecta*, Schœnh.; *rostratus*, Kirby, &c.—remarkable for a projection on their head resembling a horn, may perhaps form another subgenus.

Cassida, Lin. Fab.

The Cassidæ are distinguished from the Hispæ by the following characters. The body is orbicular or almost ovoid, and in some few nearly square. The thorax, more or less semicircular, or forming the segment of a circle, entirely conceals and covers the head, or encloses it in an anterior emargination. The elytra, frequently elevated in the region of the scutellum, project beyond the body. The mandibles present four teeth at least, and the exterior maxillary lobe is at least as long as the inner one.

The Imatidia—*Imatidium*—of Fabricius, only differs from his Cassidæ in their head, which is exposed and fixed in the emargination of the thorax. In both the body is depressed, almost round, in the form of a shield or a little Tortoise, frequently elevated into a pyramid on the middle of the back, and overlapped all round by the sides of the thorax and elytra. The under surface is flat, so that these Insects seem as if glued to the spot to which they are attached.

C. equestris, Fab.; Oliv., Col., V, 97, i, 3. Closely allied to the following species, but rather larger, and only found in aquatic localities on Mint. It is green above and black beneath; margin of the abdomen and the feet yellowish.

C. viridis, L.; Oliv. Col., II, 29. Length one line and a half; it only differs from the equestris in the puncta of the elytra, which form regular lines near the suture; the thighs are most commonly black.

The larva lives on Thistles, and most commonly on the Artichoke. Its body is extremely flat, and the whole margin is covered with spines; it covers itself with its fæces, which it keeps suspended in a mass on a kind of fork situated near the orifice of the anus. The nymph is also much flattened, and has delicate and serrated appendages along its sides; its thorax is broad, rounded anteriorly and conceals the head.

In the larva of a species found in St Domingo—*C. ampulla*, Oliv.—the fæces are disposed in numerous and articulated threads, which resemble a sort of wig. The

C. nobilis, L.; Oliv., Ib., II, 24. Yellowish grey, with a golden-blue streak near the suture, which disappears with the death of the Insect(1).

In the second tribe, or the CHRYSOMELINÆ, the antennæ are remote, and inserted before the eyes, or near their internal extremity. These Insects never leap. With those of the following tribe, and some belonging to the preceding family, they compose the genus *Chrysomela* of Linnæus, which we have restricted by the admission of others, on account of its great extent.

Those species in which we find the above mentioned characters, form, as in the earlier entomological works of Fabricius, two genera.

The first, or

CRYPTOCEPHALUS,

Is composed of Chrysomelinæ, in which the head is plunged vertically into an arched or hood-like thorax, in such a manner that the body, most commonly in the form of a short cylinder, or almost ovoid and narrowed anteriorly, when viewed from above, appears as if truncated at that extremity and destitute of a head. The antennæ of some are more or less serrated or pectinated; those of others are long and filiform. The last joint of the palpi is always ovoid.

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(1) For the other species, see Oliv., Ib.; Fab., Syst. Eleut.; Schœnh., Synon. Insect., II, p. 134, and 209.

Sometimes the antennæ are short, pectinated, or serrated from the fourth or fifth joint.

Here the exterior margin of the elytra is straight, or is but slightly emarginated; the posterior angles of the thorax are rounded and not arched, and the anterior ones are not bent underneath. The body is always in the form of a short cylinder; the antennæ are always free, and the eyes entire or but slightly emarginated. The males frequently have the head broader, the mandibles stronger and more salient, and the anterior legs longer.

Clythra, Leach, Fab.—*Melolontha*, Geoff.

> *C. quadripunctata; Chrysomela quadripunctata*, L., Oliv., Col. VI, 96, i, 1. From four to five lines in length; black; elytra red, each marked with two black dots, the anterior of which is the largest.
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> The larva inhabits a coriaceous tube that it drags about with it, and which with the animal was sent to me by M. Waudoner, from Nantes(1).

There, the elytra, strongly dilated exteriorly at their origin and then suddenly narrowed, present a deep emargination. The posterior angles of the thorax are acute, arched and form a roof; the anterior are strongly curved underneath. The antennæ are laid along its inferior sides, or are lodged under its edges. The eyes are evidently emarginated in several. The superior surface of the body in those, and they are the greatest number, where it is less short and convex, is usually very uneven.

These Chrysomelinæ are exclusively proper to the western continent.

Chlamys, Knoch.

Where the form of the body approaches that of a short cylinder or of a cube, with the thorax abruptly elevated, and as if hump-backed in the middle, and the middle of its posterior margin prolonged or unilobate. The body is in general extremely scabrous. In some the labial palpi are forked(2).

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(1) See Olivier and Fabricius, but abstract from the genus of the latter those species which belong to the following one.

(2) See Olivier, but more especially the excellent Monograph of M. Kollar, and that of Klüg. See also Knoch, New. Beytr. Insect., p. 122, and Lat., Gener. Crust. et Insect., III, p. 53.

LAMPROSOMA, Kirb.

Where the body is almost globular, extremely convex, very smooth, and the thorax very short, very broad, gradually raised and slightly lobate at the middle of its posterior margin. The five last and serrated joints of the antennæ are less dilated than in the preceding ones(1).

Sometimes the antennæ, evidently longer than the head and thorax united, are simple and filiform, or thickest at the end, or even terminated in a club, in which case they are serrated, but only from the seventh joint. The body, in several, is ovoid and narrowed before. The last joint of the antennæ is appendiculated, so that their number seems to amount to twelve.

Here, the body is cylindrical, and the thorax as wide as the abdomen throughout.

CRYPTOCEPHALUS, Geoff.

Where the antennæ and palpi are the same thickness everywhere.

C. sericeus; Chrysomela sericea, L.; Oliv., Col., VI, 96, i, 5. Three lines in length, and of a golden-green; antennæ black, with a green base. Very common on the semiflosculosæ(2).

CHORAGUS, Kirb.

Where the antennæ are terminated by three thicker joints forming a club, and the palpi are attenuated at the extremity(3).

There, the body is narrowed anteriorly and is almost ovoid.

The five last joints of the antennæ are frequently larger, more or less compressed, and more or less dilated and serrated. The maxillary palpi are thicker at their extremity or almost terminated by an ovoid club, formed either by the last joint, or by that and the preceding one.

EURYOPE, Dalm.

Where the mandibles are very strong, and where the second joint of the antennæ is manifestly longer than the third(4).

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(1) *Lamprosoma bicolor*, Kirb., Lin. Trans., XII, xxii, 15. See especially the Insect. Spec. Nov. Germ., p. 574, 575.

(2) For the other species, see Olivier, Fabricius, and Schœnherr.

(3) *Choragus Scheppardi*, Kirb., Lin. Trans., XII, xxii, 14.

(4) Dalm., Ephem. Entom., I, p. 17. The *E. rubra*, Lat., Gener. Crust. et Insect., I, ii, 6, is from Senegal and Abyssinia.

EUMOLPUS, Klüg, Fab.

Where the mandibles are of the ordinary size, and the second joint of the antennæ is shorter than the following one.

E. vitis, Fab.; Panz., Faun. Insect. Germ., LXXXIX, 12. Black, pubescent; elytra, base of the antennæ, and the legs reddish-brown; very injurious to the Vine.

This subgenus, through the Colaspes, and by an almost insensible transition, is connected with the genus

CHRYSOMELA,

When the body is usually ovoid or nearly oval, and the head salient, projecting, or simply inclined; where the antennæ are simple, about half the length of the body, and most frequently granose and insensibly enlarged towards the extremity.

Some, in which the body is always ovoid or oval and provided with wings, and the palpi terminate in a point, approach the Eumolpi, and are distinguished from the other following Chrysomelinæ by their filiform antennæ, which are longer than the half of the body, and consist of elongated and almost cylindrical joints, the eleventh or last of which is terminated by an appendix or false joint, the length of which is almost equal to that of the half of the preceding portion of that joint. Such are

COLASPIS, Fab.

Where there is no sternal projection(1).

PODONTIA, Dalm.

Where the mesosternum projects in a short and conical point, the end of which is received into a posterior emargination of the præsternum(2).

The first and penultimate joint of the tarsi is very large and strongly dilated; the second is small. The last joint of the maxillary palpi is conical. The body is oblong, depressed, or but little elevated, while in Colaspis it is generally short and very convex.

In the following Chrysomelinæ of the same tribe, the antennæ are shorter and composed of obconical joints, or are more or less almost granose and gradually enlarge towards the extremity; the false joint or appendage terminating the last is very short or indistinct.

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(1) See Fabricius, Olivier, Schœnherr and Germar.

(2) Dalm., Ephem. Entom., I, 23. Of this number is the *Chrysomela 14-punctata*, Fab.; Oliv. Col., V, 91, iv, 42.

The maxillary palpi of some are thicker and truncated at the extremity.

Of these there are some in which the two last joints of those palpi are united and form a truncated club; the last is shorter than the penultimate, and is either transversal or in the form of a very short and truncated cone.

Phyllocharis, Dalm.

Where there is no mesosternal projection(1).

Doryphora, Illig.

Where the mesosternum, on the contrary, advances in a point or in the manner of a horn. The species of this subgenus are proper to South America(2); those of the preceding one inhabit New Holland and the island of Java. These, of which there are but few, differ from the preceding in their more elongated and much less elevated body, and in their antennæ, the first joints of which are proportionally shorter, thicker, and more rounded at the extremity; the second is almost globular and scarcely shorter than the third.

Two species are found in Spain which should form another subgenus—*Cyrtonus*, Dalm. As in Phyllocharis, there is no mesosternal projection, but the joints of the antennæ are proportionally longer and more obconical; the body is more convex, and the thorax higher transversely and pulviniform, or rounded in the middle, whilst its surface is plane or on a level in the preceding subgenera(3).

Another subgenus,

Paropsis, Oliv.—*Notoclea*, Marsh,

Of which all the species are exclusively proper to New Holland, is distinguished from all the others of this family by the maxillary palpi, the last joint of which is much larger and securiform(4).

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(1) Dalm., Ephem. Entom., I, p. 20. The Chrysomelæ *cyanipes*, *cyanicornis*, *undulata*, of Fabricius. See Olivier, Col., V, 91, iv, 50, 46, and vii, 99, 100.

(2) Oliv., Col., V, continuation of No. 91, *Doryphore*. See also the Insect. Spec. Nov., Germar.

(3) *Chrysomela rotundata*, Dej., and another very analogous but striped species. I have received from Dr Leach a Chrysomela allied to the Doryphoræ, in the male of which the antennæ present but eight joints, the two last forming a club. It constitutes his genus *Apamæa*. The *Chrysomela badia* of Germar appears to form another.

(4) See Oliv., Col., V, 92; but we must take away the *P. flavicans*—*Chrysomela flavicans*, Fab.—which is a true Chrysomela. See also the Monograph of the same genus, but under the name of *Notoclea*, published by M. Marsham in the Transactions of the Linnean Society.

In the two following subgenera the same joint, also well separated from the preceding one, and quite as large or larger, is more or less semi-ovoid. These Insects are more abundantly disseminated throughout the eastern continent, and Europe in particular.

TIMARCHA, Meg. Dej.

The Timarchæ, which were formerly placed among the Chrysomelæ, comprise those which are apterous. Their body is gibbous, the antennæ are granose, inferiorly in particular, the elytra united, and the tarsi usually much dilated, at least in the males.

These Chrysomelinæ are found on the ground in the woods, on grass, and along the edges of roads. Their gait is slow, and they emit a yellowish or reddish humour from the articulations of their legs. They are most common in the south of Europe and north of Africa.

Among those in which the thorax is narrowed posteriorly and approaches to the form of a crescent, and generally the largest species, is placed,

T. lævigata; Tenebrio lævigatus, L.; Oliv., Col., V, 91, i, 11. From four to eight lines in length; black; thorax and elytra smooth, but finely punctured; antennæ and legs violet.

Its larva is greenish or violet, strongly inflated, and has a fulvous extremity. It feeds on the yellow Gallium, and undergoes its metamorphosis in the earth(1).

CHRYSOMELA proper.

This subgenus will comprise such of Olivier's species as are furnished with wings, and in which the maxillary palpi, according to our previously established subdivisions, have the last joint as large as the preceding ones or larger, and in the form of a truncated, ovoid, or reversed cone. Such are

C. sanguinolenta, L.; Oliv., Ib., I, 8. About four lines in length; black, or bluish-black; sides of the thorax thickened and punctured; elytra deeply punctured and widely emarginated exteriorly with red. Found on the ground in fields, and along the borders of roads.

C. cerealis, L.; Oliv., Ib., VII, 104. Size of the preceding; cupreous-red above with longitudinal, blue streaks, three on the thorax and seven on the elytra. Common in France.

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(1) Add the following species of Olivier. *rugosa, scabra, latipes, coriaria, gœttingensis*. See also the Catalogue, &c., of Count Dejean: but as I only distinguish the Timarchæ from the Chrysomelæ by the absence of wings, I am not sure that all the species he mentions are in this case.

C. populi, L.; Oliv., Ib., VII, 110. Length from five to six lines; oval, oblong, and blue; elytra fulvous or red, and the inner angle of their extremity marked with a black dot. On the Willow and Poplar; its larva lives on the same trees, and frequently in society.

This species, and some others equally oblong, with a thorax narrower than the elytra, and forming a transversal square thickened on the sides, constitute the genus *Lima* of Megerle(1).

We will terminate this tribe with those Chrysomelinæ whose maxillary palpi are attenuated at the extremity and terminated in a point. They will form two subgenera.,

PHÆDON,—*Colaphus*, Meg.

Where the body is ovoid or orbicular(2), and

PRASOCURIS, Lat.—*Helodes*, Fab.

Where the body is narrower, more elongated and almost a parallelopiped, and where the diameters of the thorax are nearly equal. The four or five last joints of the antennæ are dilated, and almost form a club(3).

In the third and last tribe of the Cyclica, that of the GALERUCITÆ, we find antennæ always at least as long as the half of the body, of equal thickness throughout, or insensibly thicker towards their extremity, inserted between the eyes, at but little distance from the mouth, and usually approximated at base, and near a small longitudinal carina. The maxillary palpi, thickest about the middle, terminate in two joints, in the form of a cone, but opposed or united at base, the last short, and either truncated or obtuse or pointed. The body is sometimes ovoid or oval, and sometimes almost hemispherical. In several, and particularly the smaller species, the posterior thighs are very stout, which enables them to leap.

This tribe is composed of the genus

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(1) See the Catalogue, &c., of Dahl.

(2) See the Catalogue of Dahl, but add to it certain Chrysomelæ, such as the following: *raphani*, *vitellinæ*, *polygoni*, &c. The antennæ of the species called *armoraciæ*, *cochleariæ*, in the thickening of their terminal extremity, closely approach those of the Helodes.

(3) See Lat., Gener. Crust. et Insect., III, p. 57, Fabricius, Olivier, Schœnherr, and Gyllenhall. To the species quoted, add the *aucta*, *marginella*, *hannoverana*.

GALERUCA,

Which we will divide into two principal sections; those which are destitute of the power of leaping or the Isopoda, and the Jumpers or the Anisopoda.

Some species foreign to Europe, in which the penultimate joint of the maxillary palpi is dilated, and the last much shorter and truncated, form the genus

ADORIUM, Fab.—*Oïdes*, Web.(1)

Those, in which the two last joints of the maxillary palpi differ but little as to size, and in which the antennæ, composed of cylindrical joints, are at least as long as the body, have been distinguished by the generic name of

LUPERUS, Geoff.(2)

The others, which, with similarly terminated palpi, have shorter antennæ composed of obconical joints, form the true Gallerucæ or the

GALERUCA, Geoff.

Such are the

G. calmariensis; Chrysomela calmariensis, L.; Oliv., Col., VI, 93, iii, 37. Three lines in length; yellowish or greenish above; three black spots on the thorax; another with a stripe of the same colour on each elytron.—This species, together with its larva, is found on the Elm; in certain seasons when unusually abundant, it strips these trees of their foliage, and does as much mischief as certain caterpillars.

G. tanaceti; Chrysomela tanaceti, L.; Oliv., Ib., I, 1. Oval, oblong, very black and but slightly glossy; elytra deeply punctured and without striæ. On Tansy(3).

The jumping Galerucitæ, or those whose posterior thighs are inflated and which are distributed by Fabricius among the genera *Chrysomela*, *Galeruca* and *Crioceris*, are united in one, that of *Altica* or *Haltica*, in the systems of Geoffroy, Olivier and Illiger. These Insects are very small, but are ornamented with various or brilliant colours; they jump with great quickness and to a very great height, and frequently destroy the leaves of those plants on which they feed. Their larvæ devour the parenchyma, and there undergo their metamorphosis. Certain species, those particularly which are commonly termed *garden fleas*, are very injurious in both states to our kitchen gardens. Of all countries, South America furnishes the greatest number. Illiger, in his Entomological Magazine, has published an excellent Monograph of these Insects, which he arranges in nine families, and some of which, in our opinion, should form separate subgenera. Those of the subgenus

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(1) Web., Observ. Entom.; Lat., Gen. Crust. et Insect., III, p. 60, and I, xi, 9; Oliv., Col., V, 92, bis; Schœnh., Ib., II, p. 230; Fab., Syst. Eleut.

(2) Oliv., Col. IV, 75, bis; Schœnh., Ib., p. 292, 294; Germ., Insect. Spec. Nov., p. 598.

(3) See Oliv., Col., Ib.

OCTOGONOTES, Drap.(1)

Are removed from all others by the form of their maxillary palpi. As in Adorium, the penultimate joint is thick and turbiniform, and the last very short and truncated; the termination of the labial palpi is acuminate or subulate, as in all the following subgenera; but here the maxillaries are similarly formed, or are also subulate at their extremity. The last joint of the posterior tarsi of the Octogonotes is abruptly inflated and rounded above, or ampullaceous, with the two terminal hooks inferior and small.

ŒDIONYCHIS, Lat.

Is distinguished by this last character from the following subgenera. To this subgenus we refer the two first families of Illiger's Monograph.

But a single species is found in Europe—the *A. marginella*, Oliv., Col., VI, 93, *bis*, ii, 34—and even that is confined to Spain and Portugal(2).

In the remaining subgenera the last joint of the tarsi is elongated and gradually thickened, with the two hooks, of the ordinary size, situated as usual at its extremity, and in a longitudinal direction.

PSYLLIODES, Lat.

Where the first joint of the posterior tarsi is very long and inserted above the posterior extremity of the tibiæ; this extremity is prolonged in the manner of a conical, compressed, and hollow appendage, somewhat dentated along its edges, and terminated by a small tooth(1).

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(1) Ann. des Sc. Phys., III, p. 181.

(2) Add the *A. bicolor*, *thoracica*, *cincta*, *albicollis*, *lunata*, and some other species of Olivier.

Dibolia, Lat.—olim *Altitarsus*.

Where the greater part of the head is sunk in the thorax, and the posterior tibiæ are terminated by a forked spine(2). In Altica proper or

Altica, Lat.

The head is salient, and the posterior tibiæ are truncated at their extremity and without any particular prolongation or forked spine; the tarsus originates from this extremity, and its length is not equal to half that of the tibia.

A. oleracea; Chrysomela oleracea, L.; Oliv., Col., VI, 93, *bis*, iv, 66. About two lines in length; oval, elongated; green or bluish; a transverse impression on the thorax; elytra finely punctured. On vegetables. It is the largest of the European species.

A. nitidula; Chrysomela nitidula, L.; Oliv., Ib., V, 80. Green; head and thorax golden; legs fulvous.—On the Willow(3).

Longitarsus, Lat.

All the characters of Altica proper or of the preceding subgenus, but the posterior tarsi are at least as long as the tibiæ to which they are attached(4).

FAMILY VII.

CLAVIPALPI.

The Insects of our seventh and last family of the Tetramera are distinguished from all those of the same section, having, like them, the under part of the three first joints of the tarsi furnished with brushes and the penultimate bifid(1), by their antennæ, which are terminated in a very distinct and perfoliated club, as well as by their maxillæ, armed on the inner side by a nail or corneous tooth. In some few, the joints of the tarsi are entire, but they are removed from the other Tetramera with analogous tarsi by their body, which is almost globular and contracts into a ball.

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(1) The ninth family, or the *Altitarsi*, Illig., comprising the following species of Gyllenhall: *chrysocephala, napi, hyosciami, dulcamaræ, affinis.*

Those, which he calls *dentipes, aridella,* and some others in which the posterior tibiæ are dilated near the middle of their posterior side in the form of a tooth, with a canal beneath, longitudinal and ciliated along the edges, might constitute a separate subgenus.

(2) The eighth family, the *A. Echii*, Oliv., and the *A. occultans*, Gyll.

(3) The 3, 4, 5, 6, families of the same.

(4) The seventh, such as the *A. lurida, atricilla, quadripustulata, dorsalis, holsatica, parvula, anchusæ, atra,* of Olivier, Gyllenhall, &c.

Their body is most commonly of a rounded form, and frequently even very convex and hemispherical; the antennæ are shorter than the body, the mandibles emarginated or dentated at the extremity, and the palpi terminated by a large joint; the last joint of the maxillary palpi is very large, transversal, compressed, and almost lunate. The form of their organs of manducation shows them to be gnawers, and in fact the species indigenous to Europe are found in the Boleti which grow on the trunks of trees, under their bark, &c.

Some have the penultimate joint of the tarsi bilobate, and do not contract themselves into a ball.

They may be reunited in the single genus

EROTYLUS, Fab.

Here, the last joint of the maxillary palpi is transversal, and almost lunate or securiform.

EROTYLUS, Fab.

In the Erotyli properly so called, and from which the *Ægithi*, Fab., do not appear to us to be essentially distinct, the intermediate joints of the antennæ are almost cylindrical, and the club, formed by the last ones, is oblong; the interior and corneous division of their maxillæ is terminated by two teeth.

They are peculiar to South America(2).

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(1) The last has a knot at base, a character also observed in the Coccinellæ.

(2) See Oliv., Col., V, 89; Schœnh., Synon. Insect., II, genera *Ægithus*, *Erotylus*; and the Monograph of this genus by M. Duponchel, who has continued the work of Godart on the Lepidoptera of France, inserted in the Mémoires du Muséum d'Histoire Naturelle.

TRIPLAX, TRITOMA, Fab.

These Insects differ from the Erotyli in their antennæ, which are almost granose, and terminated in a shorter and ovoid club, and in their maxillæ, of which the interior division is membranous with a single and small terminal tooth.

Those which are almost hemispherical or nearly round form the genus TRITOMA of Fabricius. Such is the

T. bipustulatum, Oliv., Col. 89, *bis*, I, 5. Black, with a large red spot at the base of each elytron. In the Boleti and Mushrooms(1).

Those which are oval or oblong form the genus TRIPLAX proper of the same naturalist(2).

In the other the last joint of the maxillary palpi is elongated, and more or less oval.

LANGUIRA, Lat. Oliv.—*Trogosita*, Fab.

Where the body is linear and the antennal club consists of five joints.

They are all foreign to Europe(3).

PHALACRUS, Payk.—*Anistoma*, Illig. Fab.—*Anthribus*, Geoff. Oliv.

Where the body is almost hemispherical and the club of the antennæ consists of but three joints(4).

On flowers and under the bark of trees.

In the remaining Clavipalpi all the joints of the tarsi are simple, and the body is nearly globular. They form the genus

AGATHIDIUM, Illig.—*Anisotoma*, Fab.(5)

In the fourth section of the Coleoptera, that of the TRIMERA, there are but three joints to all the tarsi. The Trimera form three families. Those of the two first are closely related to the last of the Tetramera. Their antennæ, always composed of eleven joints(1), terminate in a club formed by the three last, which is compressed and in the form of a reversed cone or triangle. The first joint of the tarsi is always very distinct; the penultimate is usually bilobate, and the last, which presents a knot at base, is always terminated by two hooks. The elytra entirely cover the abdomen and are not truncated. The last of the Trimera, or those of the third family, in this character, as well as in several others, approximate to the Pentamerous Brachelytra, and some other Coleoptera of the same section, such as the Mastigi and Scydmæni; their habits are also very different from those of the other Trimera.

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(1) Fab., Syst. Eleut.

(2) Fab., Ib. See Oliv., Col. V, 89, bis, genus *Triplax*. The *Tritomæ*, Geoff., are Mycetophagi.

(3) Lat., Gener. Crust. et Insect., III, p. 65, I, xi, 11; Oliv., Col. V, 88. Add the Trogositæ *elongata* and *filiformis*, Fab.

(4) See Gyll., Insect. Suec., and Sturm, Faun. Germ., II, xxx, xxxii.

(5) See the Faun. Germ., Sturm, and the Insect. Suec., Gyll., &c.

FAMILY I.

FUNGICOLÆ.

In our first family of this section we observe antennæ longer than the head and thorax united, an oval body, and a trapezoidal thorax. The maxillary palpi are filiform or a little thicker at the end, but are terminated by a very large and securiform joint. The penultimate joint of the tarsi is always deeply bilobate.

This family may be reduced to one great genus.

Eumorphus.

In some the third joint of the antennæ is much longer than the preceding and following ones. Such are

Eumorphus, Web. Fab.

Or the Eumorphi proper, where the club of the antennæ is abrupt, compact, strongly compressed, and in the form of a reversed triangle. The maxillary palpi are filiform, and the two last joints of the labials united form a triangular club.

They are all peculiar to America and the East Indies(2).

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(1) In Clypeaster I counted but nine; the Insects, however, are so small that there may have been some mistake.

(2) See Fab., Oliv.—Col. VI, 99—Schœnh., and Lat.—Gener. Crust. et Insect.

DAPSA, Zieg.

Where the club of the antennæ is narrow, elongated, and composed of joints, laterally remote, the last of which is almost ovoid(1). In the others the third joint is but little longer than that of the preceding and following ones.

Several species are indigenous to Europe, and live in the Lycoperdons, or under the bark of the Birch and some other trees.

ENDOMYCHUS, Web. Fab.

Where the four palpi are thickest at the extremity; the three last joints of the antennæ are separated laterally, are larger than the preceding ones, and compose a club in the form of a reversed triangle(2).

LYCOPERDINA, Lat.—*Endomychus*, Fab.

Where the maxillary palpi are also filiform; the last joint of the labials is larger than the preceding ones, and almost ovoid; the fourth and following ones of the antennæ, to the ninth inclusively, are almost granose, and the two last in the form of a reversed triangle(3).

FAMILY II.

APHIDIPHAGI.

This family consists mostly of Insects which have an almost hemispherical body, and a very short, transversal, and almost lunate thorax. Their antennæ terminate in a compressed and obconical club, composed by the three last joints, and are shorter than the thorax. The last joint of the maxillary palpi is very large and securiform, and the penultimate joint of the tarsi is profoundly bilobate.

In the other Trimera of the same family, the joints of the

III, p. 171—but, with the exception of the *E. Kirbyanus*, which, it appears to me, should be referred to Dapsa.

(1) See Catalogue, &c., Dahl. Add the *Eumorpus Kirbyanus*, Lat., Gener. Crust. et Insect., I, xi, 12.

(2) See Lat., Gener. Crust. et Insect., III, p. 72; Gyllenh., Insect. Suec.; and the Catalogues of Dahl and Dejean.

(3) See the above works, and the Insect. Spec. Nov. of Germar.

tarsi are simple, and the penultimate at least is slightly bifid, which, with some other characters, distinguishes these Insects from the Fungicolæ.

Here, the body is more or less thick, and never much flattened in the manner of a shield; the thorax is transversal; the head is exposed; the antennæ consist of eleven distinct joints, the last of which form an obconical club.

These Insects compose the genus

COCCINELLA.

LITHOPHILUS, Frohl.

Where the body is ovoid, the thorax strongly recurved laterally and narrowed posteriorly, and the penultimate joint of the tarsi, as well as the preceding one, is very slightly bifid(1). In

COCCINELLA, Lin. Geoff. Fab. Oliv.

Or Coccinella proper, the body is almost hemispherical, the thorax very short, almost lunate, the margin not recurved or but very slightly, and the penultimate joint of the tarsi profoundly bilobate.

Various species of this genus are extremely common on the trees and plants of our gardens, and frequently in our houses; they are known by the names of the *Scarabées hemispheriques* or *Tortues*, *Bête à Dieu*, *Vache à Dieu*, *Cow-bug*, *Lady-bug*, &c. The figure of these Insects, which is frequently hemispherical, the number and arrangement of the spots on their elytra, that form a sort of mosaick on a fulvous, yellow or black ground, together with the vivacity of their motions, render them easily distinguishable. They are among the first that appear in spring. When seized, they fold their legs against their body, and like the Chrysomelæ, Galerucæ, &c. expel a yellow mucilaginous humour of a penetrating and disagreeable odour, from the articulation of the thighs with the tibiæ. They feed on Aphides, their larvæ, which in form and their metamorphoses greatly resemble those of the Chrysomelæ, employing the same aliment. According to the observations of M. Leon Dufour, they are provided with salivary vessels.

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(1) *Lithophilus ruficollis*, Dahl, Catal., p. 44; *Tritoma connatum*, Fab. This genus would perhaps be placed more naturally near *Triplax*, Fab.; but in the antennæ it also approaches the Coccinellæ. Count Dejean arranges it among the Heteromera.

Individuals, very different as to colour, are sometimes fou in coitu—the result of this intercourse, however, has never be observed.

C. 7-punctata, L.; Oliv., Col. VI, 98, i, 1. Length, thr lines; black; elytra red, with three black dots on each and seventh, common to both, underneath the scutellum. The mo common species in France.

C. 2-punctata, L.; Oliv., Ib., vii, 104. All black, with a shor red, transverse band on the elytra(1).

There, the body is much flattened, in the form of a shield; an the head is concealed under an almost semicircular thorax. Th antennæ present distinctly but nine joints, and terminate in an elo gated club. The joints of the tarsi are entire. The præsternu forms a sort of chin-cloth anteriorly.

Such are the characters of the genus

CLYPEASTER, Andersch.—*Cossyphus*, Gyll.

They are found under the bark of trees, and under stones(2).

FAMILY III.

PSELAPHII(3).

These Insects, which constitute our third and last family of the Trimera, in their short and truncated elytra that only cover part of the abdomen, bear a certain resemblance to the Brachelytra, and particularly to the Aleocharæ. This last part of their body, however, is much shorter, wide, very obtuse and rounded posteriorly. The antennæ, terminated by a club or thicker towards the extremity, sometimes consist of but six joints. The maxillary palpi are usually very large, and all the joints of the tarsi are entire; the first, much shorter than the following ones, is scarcely visible at the first glance, and the last is most commonly terminated by a simple hook.

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(1) For the other species, see Oliv., Ib.; Schœnh., Synon. Insect., II, p. 151, and Gyllenh., Insect. Suec. The genera *Scymnus* and *Cacidula*, separated from the preceding one, do not appear to me to be sufficiently distinct from it.

(2) See Schœnherr and Gyllenhall. One species, the *C. pusillus*, Dej., is figured by Ahrens in his Faun. Insect. Europ., fascic., VIII, t. X.

(3) But few Insects are now so well known as these. For this knowledge we are chiefly indebted to the zeal and labours of MM. Reichenbach (Monog. Pselaph.), Muller (Mag. Entom. Germ.), Leach (Zoolog. Misc.), and Gyllenhall—Insect. Suec., IV.

They are found on the ground under the debris of vegetable matters; some inhabit certain ant-hills.

Those which have eleven joints in the antennæ form the genus

PSELAPHUS, Herbst.—*Staphylinus*, Lin.—*Anthicus*, Fab.

In some few the tarsi are furnished with hooks.

CHENNIUM, Lat.

Where the ten first joints of the antennæ are almost equal and lenticular, and the eleventh or last is larger and nearly globular. The palpi do not project(1).

DIONIX, Dej.

Where the third joint of the antennæ and the four following ones are very small, transversal and granose; the eighth and three following ones are thicker than those which precede them, cylindrical, and as long as the first seven taken together; the two penultimates are conical and equal; the last is ovoid, elongated, pointed, and the thickest of all. The maxillary palpi are very salient—but shorter than the head and thorax united—and consist of four cylindrical joints. The labials are short, directed forwards, and consist of three joints with a point at the end(2).

The others have but a single hook at the extremity of the tarsi.

Here, the maxillary palpi, flexed or geniculated, are at least as long as the head and thorax; their second and fourth joint are much elongated, narrowed at base, and terminated in a club.

Sometimes the antennæ, evidently longer than the head and thorax, terminate in a club formed by the three last joints, which are manifestly larger than the preceding ones, the last being almost ovoid or ovoido-conical.

PSELAPHUS proper.—PSELAPHUS, Herbst.(3)

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(1) Lat., Gener. Crust. et Insect. III, p. 77; a single species—*bituberculatum*—extremely well figured in the atlas of the Dict. des Sc. Nat.

(2) In this family, two of the palpi at least, are thus terminated. For this genus, see MM. Lepeletier and Serville, Encyc. Méthod., Entom., X, p. 221.

(3) The Pselaphii *Herbstii*, *Hiesii*, *longicollis*, *dresdensis*, &c. of Reichenbach or his first family of this genus; the thorax is elongated.

Sometimes the ninth and tenth joints of the antennæ, the length of which, at most, is equal to that of the head and thorax, are hardly larger than the preceding ones; the eleventh or last is alone much thicker, nearly spherical, and with an acicular point at the end.

BITHYNUS, Leach.

Where the second joint of the antennæ is much thicker than the first, and dilated on the inner side in the manner of a tooth(1).

ARCOPAGUS, Leach.

Where, on the contrary, the second joint of the antennæ is much more slender than the first, and where the latter is even sometimes dilated(2).

There the maxillary palpi are shorter than the head and thorax taken together; the fourth joint at least is short or but slightly elongated, and ovoid or triangular.

CTENISTES, Reich.

These Insects are very distinct from all others of the same family, in the three last joints of their maxillary palpi, on the outer side of which we observe a point or tooth with a terminal seta; the second is very long, arcuated, and inflated and rounded at the end; the two following ones are almost globular. The last joint of the antennæ is much larger than the preceding ones, and somewhat oval. The thorax forms an elongated and truncated cone(3).

BRYAXIS, Leach.—*Euplectus*, *Tychus*, Ejusd.

Where no such characters are presented by the maxillary palpi; their last joint is elongated and conical or securiform. The thorax is short, hardly longer than wide, and rounded(4).

In the last of the Pselaphii we observe this peculiarity—their antennæ consist of but six joints, or even one. They form the genus

CLAVIGER,

CLAVIGER proper,

Where the antennæ consist of six distinct joints.

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(1) *Ps. securiger*, ejusd. See Leach, Zool. Miscell., III, page 80, 82, 83.

(2) *Ps. glabricollis*, Reich.; ejusd., *Ps. clavicornis;* Leach, Ib., 80, 83, 84.

(3) Reich., Monog., p. 75, et seq.

(4) See Leach, Zool. Misc. The form of the last joint of the maxillary palpi, as well as the relative proportions of those of the antennæ, may offer good characters for division, but they do not appear to me of sufficient importance to designate generic sections. See the article *Pselaphiens* of the Encyclopédie Méthodique.

These Insects have no apparent eyes. The maxillary palpi are very short, without distinct articulations, and with two terminal hooks. The two first joints of the tarsi are very short; the third and last is very long, with a single hook at the extremity.

These Pselaphii are found under stones in barren localities, and even in the hills of certain small yellow Ants. An excellent Monograph of this genus has been published by M. Müller, in the third volume of the Magasin der Entom. of M. Germar(1).

Articerus, Dalm.

Where the antennæ appear to be composed of a single joint, forming a cylindrical and elongated club, truncated at the extremity. The eyes are distinct and the tarsi are terminated by two hooks(2).

The tarsi of the *Dermestes atomarius* of De Geer having appeared to M. Leclerc de Laval to be composed of but one joint, with this Insect and some others we formerly established a new division of the Coleoptera, that of the Monomera, which has been adopted by M. Fischer in his Entomographia Imperii Russici, and who, with this Insect, has formed a new genus which he names *Clambus*. But it appears—Gyllenh., Insect. Suec. IV, p. 292, 293—that M. Schuppel, who of all our entomologists has accustomed himself the most to minute and delicate observations, has made the same section under the name of *Ptilium*. M. Gyllenhall had united the species with the Scaphidia, and, in fact, we think that the proper situation of this new genus will be found in the vicinity of the latter.

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(1) See also Gyll., Insect. Suec., IV, p. 240.

(2) *Articerus armatus*, Dalm., Insects in Copal, p. 21, tab. v, f. 12. According to this figure, the tarsi are provided with two hooks.

EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. *Grapsus penicilliger*, of the natural size, *porte-pinceau*, p. 39.

Fig. 2. *Remipes testudinarius*, Lat. The subgenus is mentioned p. 57, and this species in note 2 of the same. It is yellowish and somewhat rugose, with five teeth in the anterior margin. See Lat., Gener. Crust. et Insect., I, p. 45.

Fig. 3. *Pagurus laticauda*, half size; a species of the division of the *Pagurus latro* of the genus Birgus, Leach, quoted p. 58, much smaller and reddish; the two posterior feet very distinct, and, as well as the two preceding ones, bifid at the extremity; intermediate antennæ as long as the lateral ones, or even longer; otherwise similar to the *P. latro*—From the East Indies.

Plate II.

Fig. 1. *Goliath barbicornis*, the male, of a natural size; above, a deep, dead, reddish-brown, tinged with bronze and dotted with grey; beneath and the legs bronze-green; anterior extremity of the head deeply cleft into two elevated, compressed and triangular horns, furnished on the inner side with yellowish down. From Brazil, and sent to the Muséum d'Histoire Naturelle, by M. Alexander Mac-Leay, Secretary to the Linnæan Society. For this genus, see p. 435.

Fig. 2. *Buprestis scutellatus*, B, of the natural size; bronze above, and golden-green beneath; an impression with a cupreous-red spot near each posterior angle of the thorax; elytra with elevated lines resembling nervures, and five teeth on the exterior margin. It is in this last mentioned character only that it differs from the *B. scutellaris*, Fab., which inhabits the Isle of France, together with the preceding one.

Fig. 3. *Lucanus serricornis*, the male of the natural size;

glossy-black; head broad, with mandibles almost twice its length, and terminated in a denticulated forceps, circularly distant at base. From Madagascar.

Fig. 4. *Cetonia bicornis*, the male, of its natural size; oval, slightly narrowed posteriorly and of a glossy black; the elytra, base and opposite extremity excepted, red; the head divided into two long, projecting, compressed, and pointed horns. Brought from Timor by Messrs Peron and Lesueur.

Fig. 5. *Hispa marginata* of the natural size; bluish-black above and yellowish beneath; head, sides of the thorax, exterior margin of the elytra, their suture, and a transverse line near their middle, reddish. From Brazil. This species is a Fabrician *Alurnus*.

Fig. 6. *Helæus perforatus* of the natural size; body, deep-black and glossy; an opening in the anterior part of the thorax for the passage of the head, and the two lobes of the emargination crossing each other; disk of the elytra furnished with hairs arranged in longitudinal lines. Brought from the Kanguroo Islands by Péron and Lesueur.

Fig. 7. *Brentus appendiculatus* of the natural size; blackish-brown; length of the head and proboscis equal to half that of the body; elytra with russet spots arranged in one line, abruptly narrowed at the extremity and prolonged in the manner of a linear tail; thighs simple.

This Insect was brought from the Isle of France by M. Cattoire. Olivier having described, under a nearly similar specific appellation (*en queue*), a species very analogous to this one in the termination of the elytra, we will call the Brentus, here represented, as Count Dejean has done, the Appendiculatus.

N.B. For these various genera, see Index.

Plate III.

Fig. 1. *Panagæus quadrimaculatus*, Oliv., Encyc. Méthod.; of the natural size; black; a notch in each side of the thorax; elytra with punctured striæ, and two fulvous-yellow spots on each. From Port Jackson. Péron and Lesueur.

Fig. 2. *Pamborus alternans*, Lat., Encyc. Méthod., of the natural size; side of the thorax violet-blue; elytra dark-bronze and sulcated, sulci cut by transverse incisures, with a range of granules. Port Jackson. Peron and Lesueur.

Fig. 3. *Elater bicruciatus*, of the natural size; black; superior surface of the thorax and elytra red; centre of the thorax black, with two sulci and a rib in the middle; elytra striated, with a band along the suture, a second that is transverse near the middle, and a third at their extremity, all black; antennæ pectinated.—From Madagascar.

Fig. 4. *Onitis subflavus*, the male of a natural size; yellowish tinged with bronze on the thorax and head; an elevated transverse line on the anterior superior part of the head, with a second angular one, interrupted in the middle, behind the preceding one; elytra striated, with a plait at the exterior margin.—Port Jackson. Péron and Lesueur.

Fig. 5. *Cetonia bicornis*, the female, of the natural size, similar to the male represented in Pl. I, fig. 4, but with the epistoma simply emarginated.

Fig. 6. *Helluo costatus* of the natural size; body entirely black, glossy and punctured; elytra with little ribs.—From Port Jackson. This species forms the genus Helluo of Bonnelli, p. 279.

Fig. 7. *Lamia venosa*, of the natural size; body brown, yellowish, and blackish mixed; and covered with down as well as the three first joints of the antennæ; elytra yellowish grey, with scattered, unequal and blackish spots; thorax spineless; antennæ moderate.—From Bengal. M. Cattoire.

N.B. For these various genera, see Index.

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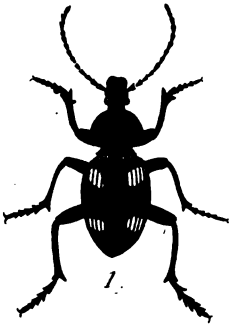
Pl. III.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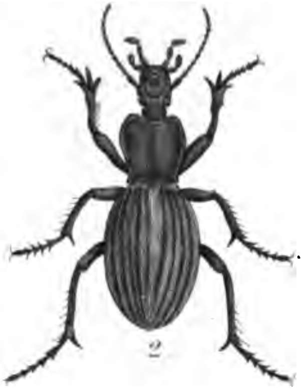
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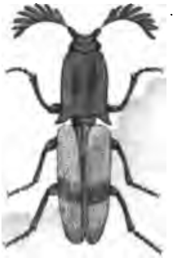
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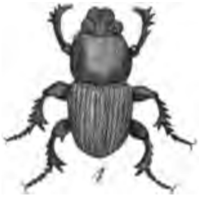
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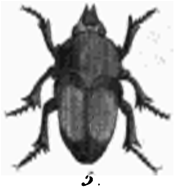
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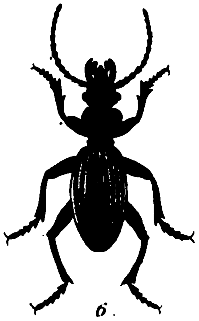
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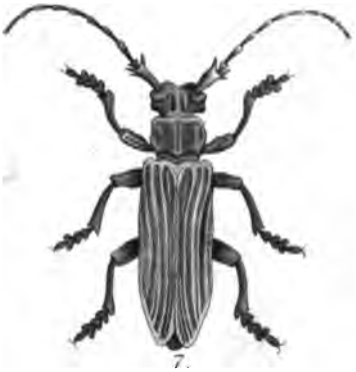
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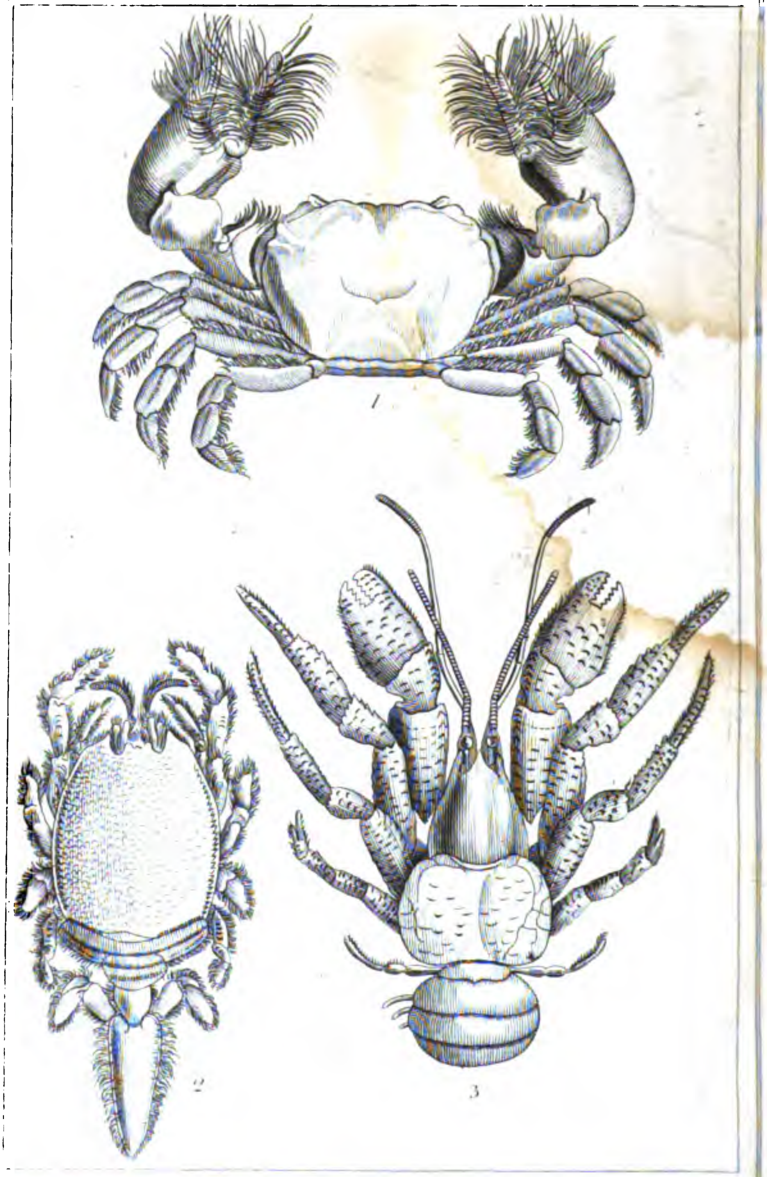
Guerillard l. Tucker Sc.

1. Panagæus quadrimaculatus. 2. Pamborus alternans.

3. Elater bicruciatus. 4. Onitis subflavus.

5. Cetonia bicornis ♀ 6. Helluo costatus.

7. Lamia venosa.



1. Grapsus penicilliger. *2. Remipes testudinarius.*
3. Pagurus laticauda.